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EDITORIALS

CRITICAL REVIEWS . . . One of your editor's duties is that of distributing for review in the journal publications submitted for that purpose, and of considering for publication reviews that may be contributed other than by request. In the execution of this work, the editor is confronted with the question of the essential purpose of a review. Should it be a philanthropic donation to the author: a compilation of all the meritorious qualities which the reviewer can possibly contrive to find in the work, with generalized compliments thrown in for good measure, or should it be a critical evaluation thereof? If it is to serve any purpose other than that of flattering the author, the latter purpose is the only one worthy of the effort either of the writer or the reader.

A critical evaluation, I take it, involves a careful analysis of the author's facts, purposes and methods, and the reviewer's candid statement of opinions relative to the merits and demerits of the work, made on the basis of such an analysis. If, in the reviewer's opinion, the work is deserving of praise, praise is given, with specific reference to the praiseworthy factors. If, however, the reviewer feels justified, for stated reasons in questioning the facts, purposes or methods manifested in the work, he has failed in the honest performance of his task if he refrains from doing so. If this statement is in error, I invite correction.

I grant that there is a courteous method of presenting adverse criticism, a means of applying the lash with the least possible sting. So long as writers possess human sensitiveness, courteous treatment should be a prevailing rule of the reviewer; at least, discourteous treatment should be avoided without exception. In the extreme, however, an overdose of courtesy may result in so concealing the criticism under polite, pseudo-complimentary verbiage that the critical point may be entirely lost to the reader, or so subdued as to lose apparent importance. I sincerely question the merits of this over-courteous method, since it results in scientific purpose being supplanted by an emotional purpose: the preservation of personal accord at all costs. Some one

has said that when men meet together in perfect agreement, progress wanes; or words to that effect. Science is essentially critical and impersonal, and students of science are worthy of the name "scientist" only in so far as their reaction to adverse criticism remains impersonal.

It is my humble opinion that courtesy in a review should correctly apply only to the personal element (which could be entirely omitted without great loss sustained by the review), and that factual and methodological matter should be treated without gloves, in clear, concise, direct style. Thus, I should say that the statement: "To cite the author's repeated use of faulty logic, he argues in a circle (citation); he begs the question (citation); and he selects his evidence throughout, as for example (citation)," is preferable to the vague apology: "To balance the author's enviable diction and fine sense of organization, one regrets that at times his logic may be described as somewhat questionable, from a severely critical standpoint, and that certain facts presented in support of his hypothesis might lose weight if counterbalanced by other facts not considered in this work."

Some writers have peculiar ideas as to what constitutes personal criticism. To say that an author is lazy, careless or dishonest, or that he has a red nose, is personal. To cite in a report a specific example of inadequacy (possibly due to laziness), inaccuracy (possibly due to carelessness), false assumption of credit (possibly due to dishonesty) or muddled diction (possibly of common origin with a red nose) is justifiable criticism and in no sense personal, as such (assuming the parenthetical remarks to be omitted).

To be sure, there are reviewers who see in a review the opportunity to indulge in exhibitions of cleverness expressed in subtle innuendoes or scintillating displays of satire. Although these compositions may be literary gems or brilliant expositions of wit, they are essentially personal in character and have no proper place in a scientific criticism. Not only are they extraneous matter of no importance in the discussion, but inasmuch as they serve only to antagonize the author of the work reviewed, they tend to defeat the ideal purpose of the review: correction, with no avoidable injury to coöperation.

On the other hand, the author whose reaction to the sincere critical treatment of his report by a fellow student is one of emotional resentment, demonstrates not only that he is a human being, but that he is for the moment an inconsistent and shortsighted one: inconsistent in that, although a student of science, he overlooks the fact that science is essentially critical; shortsighted in that he, if he has the welfare of

his subject at heart and the intelligence to profit by the corrective influences of criticism, is the major beneficiary from any criticism that has the strength to stand, and suffers not at all from futile, insupportable attacks. An intelligent critic is a scientist's best friend.

The reader desirous of testing the quantity of glass in my house is invited to throw stones by way of the Correspondence division of this journal.

W.C.M.

ARCHAEOLOGICAL WORK IN SOUTH AMERICA, 1934 TO 1936

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TWO YEARS ago Lothrop (1934)[183] published a summary of archaeological work in South America covering the years 1931–1934. This article continues the summary up to 1936. Relatively few archaeological expeditions have come to my attention in this period and consequently the review is based largely on published accounts. Such field reports as are available are incorporated under the proper sections. Thompson (1936) has published a guide leaflet on the archaeology of South America, reviewing the various fields included. Other publications refer more specifically to single sections. The review of sections starts in the Andean region, and continues with the eastern South American countries.

COLOMBIA

Mason (1936) has added a second part to his series on the Tairona Culture of Santa Marta which incorporates detailed descriptions and photographs of the bone, shell, stone and metal artifacts. Lunardi (1934, 1934a, 1934b, 1935, 1936) has a series of articles on Colombian archaeology, dealing specifically with the stone carving of San Augustín, and comparisons. The first four papers listed are in rather inaccessible journals. The last paper is on the identification of animals represented in the stone carving. Thompson (1936) in his chapter on Colombia discusses that country as a possible center of distribution of various traits to Central America. He stresses the importance of archaeological work in Colombia, which has been badly neglected.

ECUADOR

Uhle (1936) sums up his years of archaeological investigation in Ecuador in a short paper which emphasizes the constant influence of the Maya civilization. He cites Esmeraldas in particular for the visible influence of Central America in figurine modeling and design. In this connection a fine collection of Esmeraldas material has been collected and brought to this country by Dr. Ernesto Franco, whose publication *New art from Esmeraldas* is soon to be issued by the Delphic Studio of New York. Finally, Gillin (1936) gives a brief description of an urn col-

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[183] See bibliography at end of article,

lected by him from the Rio Aguarico region, eastern Ecuador, which, although unique in ways, is stylistically similar to urns from the Rio Napo region (eastern Ecuador) and the island of Marajó (Brazil).

PERU

An archaeological bibliography (Schwab, 1936) and Valcárcel's (1936) summary of work done in 1934–1935 are about the only general references to Peru as a whole which have come to my attention. Other work can be better classified in reference to regional subdivisions of Peru.

Far North Coast. My 1936 Peruvian field work included two months' work in the Lambayeque valley. Twenty-five sites were examined and three were selected for more intensive excavation. This resulted in a collection of 236 complete or restorable bowls and considerable sherd material, copper, beads and other artifacts. Nothing pertaining to or contemporaneous with the Early Chimu civilization to the south was encountered, which concurs with the results of Kroeber, Olson and others who have worked in this section. One private collection in Chiclayo contained several pieces of a related Early Chimu style, however, which suggests contacts with the south, perhaps in a Middle Chimu period. Kroeber's "cursive" style, which is classed as a Middle period to the south, was found associated with Late Chimu blackware in my excavations in Lambayeque. The collection is now being examined in preparation for a publication next year.

North Coast. Four months of my field work consisted of concentrated excavation in Virú valley and minor work in Moche and Chicama valleys. Near Virú Pueblo I excavated twenty trenches in an Early Chimu dwelling site with intrusive burials of Red-white-black and Late Chimu types. One Early Chimu burial was found at this site at two to three meters depth, with skeleton and pottery in a large urn. Two graves showed the association of Red-white-black and Late Chimu blackware. At Carmelo, near the mouth of Virú valley, I excavated in a large pyramid with habitation sites on the platforms which yielded a new type of pottery for the Peru coast. Nearby was a small cemetery of the same civilization which furnished over 100 complete or restorable bowls. Negative painted design is characteristic of this pottery. Several associated forms show influence or contact with the Early Chimu period (such as stirrup spouts, and conical-handled measuring bowls). Other shapes suggest highland influence from the general section of the Callejón de Huaylas (Recuay), which is also the center of negative painting. I believe that the analysis of the grave and sherd material

will place this Carmelo site following the Early Chimu period and before the Tiahuanaco-influenced Middle periods, or, in other words, a Middle Chimu such as Kroeber suggested.

Rafael Larco Hoyle continues his archaeological work in the north coast region, principally in Chicama valley. His private museum at Chiclín has now one of the finest Early Chimu collections in the world. He is particularly interested in the Chavin-style designed pottery found in this region. In a dry quebrada off Chicama valley he has discovered the site of Cupisnique which has hundreds of fragments of the Chavin-style pottery strewn about the surface. He advocates the use of the site name "Cupisnique," rather than the style name, "Chavin," to designate this ware. So far he has not established the chronological position of Cupisnique in reference to the Chimu periods. While Larco publishes articles in the local press, his work will not be appreciated until the book which he is preparing on the Early Chimu period is issued.

Langlois (1936) gives a description of a pyramid at Ascope, Chicama valley, which he visited on his trip in 1933. Other papers on the North Coast deal with an analysis of Early Chimu design (Muelle, 1936), deductions from these designs in reference to reduced heads, blow guns and bird raising (d'Harcourt and Nique, 1934), and Early Chimu anthropomorphic pottery (Tuya, 1936).

Central and South Coasts. Little new work has been done in the Rimac and Nazca sections. Only one reference is at hand: a paper by Doering (1936) on old Peruvian house posts and a Melanesian parallel.

Far North Highlands, North Highlands. Langlois (1935) describes remains in the immediate vicinity of Cajamarca, famous meeting place of Pizarro and Atahualpa. Otherwise little has been done recently in this archaeologically unknown section. Nor am I acquainted with further work in the North Highlands.

Central Highlands. The Peruvian government continued in 1935 its excavations, restoration, clearing and road-building around Cuzco, instigated by the 400th anniversary of the conquest of Peru. As many as 1200 workers were employed at times under the general supervision of Dr. Luis E. Valcárcel, who has published three summary articles of the work (1934a, 1934b, 1935). The Instituto Arqueológico del Cuzco was founded in Cuzco. The walls of Ajllawasi, the House of the Sun, Korikancha, Kollkampata and Chokechaka were restored. Archaeological work was concentrated in nine places, which I list below together with references to special published accounts. (I follow Valcárcel's spelling of proper names for the Cuzco region.)

1. Sajsawaman (Valcárcel, 1934, 1935b)
2. Janan Kosko (Franco, 1935)
3. Cuzco Incaic Walls (Jessup, 1934)
4. Ollantaitambo
5. Machu-pijchu (Valcárcel, 1934c, Bennett, 1935b)
6. Tarawasi
7. Pikillajta
8. Pisaj
9. Wirakocha Temple

In addition, the site of Jatun Mallka is described by Moriega (1935).

Jijón y Caamaño (1934) contributes a long article on the origin of Cuzco. Greslebin, who paid a visit to Peru in 1935, has written a short note (1934) on the aryballoid Inca pottery. A fragment of one typical aryballoid in the Cuzco museum was examined by Buck (1935) who was impressed by its obvious Tiahuanaco design and suggested that this was a proof of Tiahuanaco's contemporaneity with the Incas. Means (1935a) wrote an effective answer to this argument.

South Highlands. Both Tello and Valcárcel visited the site of Pukara, near Juliaca, and made surface sherd collections. Valcárcel (1935a) published pictures of some of these sherds as well as of statues seen at the same site. Pukara is of considerable importance in highland archaeology, since some of the statuary is of Classic Tiahuanaco type and some is quite localized. The pottery has Tiahuanaco-style designs but outlined with incisions. The colors, typically yellow-on-red, and the shapes, straight-sided, flat-bottomed, open bowls, suggest a combination of Chiripa yellow-on-red style (Bolivia) and Tiahuanaco.

Three Peruvians, Vázquez, Carpio, and Velazco (1935) visited and described the ruins of Tanka-Tanka in the South Highlands. This appears to be an Inca site. Valcárcel and Suarez (1934) exchanged letters in reference to the ruins of Churajón near Arequipa. Virtually nothing is known of the archaeology of this Arequipa section, obviously of importance in tracing Tiahuanaco distribution.

Peruvian Arts and Customs. Before leaving Peru, I will note briefly a few specialized articles which treat of Peruviana. Murdock (1934) contributes a splendid article on the Inca society, which is repeated in his general book on anthropology (1934a). Alvarado (1934) writes of Quechua society as it persists in Bolivia, and d'Harcourt (1935) describes fertility rites in ancient Peru.

Herrera, a Peruvian botanist, has two articles on ethnobotany (1934, 1934a) and, together with Yacovleff, has written two articles

identifying plants represented in modeling and design on ancient Peruvian pottery (Yacovleff and Herrera, 1934, 1935).

Means (1934) comments on the coast architecture, and Langlois (1936a) analyzed an Early Chimu vessel from Virú valley which represents a compact fortress. Langlois deduces the outline of the fortress by projecting the elements represented on the pot into a proportioned plan.

In reference to textiles, O'Neale has published three articles (1934, 1935, 1936), the first on "needleknitting," and the last on wide-loom fabrics of Early Nazca period. In the Kroeber collections, from Cahuachi, she has found a textile 6′ 8″ long and 5′ 5″ wide which, although in fragments, has without doubt been woven on one loom. This modifies the old idea that textiles were only woven on girdle-back looms of about thirty-inch width. She suggests as explanation either that several women worked simultaneously with girdle-back looms, or that the wide frame loom was known, although so far no remains of it have been found. Yacovleff and Muelle (1934), in describing a Paracas mummy bundle, also mention a wide textile which was not loom-joined. Fester and Cruellas (1934) comment on the pigments of Paracas, and Yacovleff and Muelle (1934a) add a note to this. Singer (1936) writes about the techniques of Peruvian hairnets, and Wardle (1936) writes about Inca belts and girdles. Bennett (1935a) has a general paper on Peruvian textiles. Doering (1936a) has written the text for a new edition of Lehmann's *The Art of Old Peru*.

BOLIVIA

An article and a report (Bennett 1934a, 1936) have appeared on my 1934 excavation in Bolivia. Lothrop included the main results of this excavation in his 1934 summary, but the publications have been issued since.

CHILE

North Chile. Latcham (1936, 1936a) reports briefly on a trip to the Atacameño region around Calama which he made in 1935. In the central Rio Loa region he excavated twenty-six graves of Tiahuanaco type, and at San Pedro de Atacama he found debris of a similar cemetery. Although no buildings could be positively associated with this period, it is well defined by pottery, flexed burials, Tiahuanaco-designed snuffing tubes and mixing palettes, and the absence of bronze. His sequence of periods runs from this Tiahuanaco period through Atacameño and Chincha-Atacameño to Inca.

South Chile (*Tierra del Fuego*). Junius Bird has continued his work in the southern archipelago of Chile, and in the Tierra del Fuego region around Magallanes. While much of the territory surveyed has resulted in negative data, he has found many sites, particularly in 1936, which give new distributions to the flint cultures of Navarín Island and Beagle Channel. In dry caves formed by lava outcrops at Cañadón Leona, Laguna Blanca, and at Pale Aike, just south of the Argentine border, he has excavated stratified series of stone scrapers, knives, bolas and other artifacts. The predominance of bolas over bow and arrow remains in the older levels is contrary to previous sequences. Careful determination of beach lines on this rising coast, and calculation of the rate of accumulation of wind blown deposits are serving Bird for new estimates of time chronologies which will undoubtedly prove of great interest in the final analysis of these simple cultures.

ARGENTINE REPUBLIC

Patagonia. Vignati (1934) publishes the results of a La Plata Museum excursion to the Rio Santa Cruz region in 1929–30. Stone-marked tombs (*tchenque*) were found with extended burials at about 1.50 meters depth. A description of artifacts is given. Greslebin (1935) adds another article to his previous series on the decorated stone plaques of Patagonia, and Elvins (1936) has a note on stone implements from coast shell heaps recently presented to the British Museum.

San Juan. Vignati (1934a) describes the cloth and artifacts found with a mummy at Angualasto.

Northwest Argentine. The distribution of an anthropomorphized frog design (batrachomorphic) in Catamarca, Tucumán and Salta provinces is the subject of a short paper by Márquez Miranda (1934b). Another of his articles (1934c) deals with the description and comparison of a four-note stone panpipe from Pueblo Viejo, Jujuy province. Still another article (1934a) describes the ruins and the bronze and stone artifacts at a fortress near Colanzuli, Salta province. Casanova has published two papers, one (1934) on the fortress of Huichairas, Jujuy province, and the other (1934a) on the archaeology of Coctaca, Jujuy province.

Santiago del Estero. The Wagner brothers have published an article (1934) and a monograph (1934a) on their excavations which resulted in the discovery of the Chaco-Santiagueña civilization. Greslebin (1934) and Serrano (1935) have written articles about the Wagners' discovery. The Wagners' monograph is an elaborate volume of 548 quarto pages,

with 3 plans, 732 text figures, and 106 full page plates, 45 of which are in color. It gives a superb descriptive and graphic account of their finds. The sites are composed of series of somewhat oriented mounds and pools, probably village sites, and cemeteries. A painted pottery group and an incised and modeled group have been isolated, although both are considered contemporaneous by Serrano who also notes that glass beads have been found. The Chaco-Santiagueña type seems to be a locally developed branch of the Northwest Argentine Diaguite or Calchaquí, in spite of the Wagners' search for world comparisons.

Buenos Aires. Three articles deal with the archaeology in Buenos Aires province: the first, Vignati (1936), treats the island of Martín García; the second, Márquez Miranda (1934), treats the Laguna de Lobos; and the final one, Teisseire (1934) covers the left branch of the La Plata River.

Santa Fe. Vignati (1934b) gives a detailed anthropometric account of a skeleton found at Esperanza. The geological evidence of its antiquity is uncertain. Outes (1935) announced the discovery of elaborately modeled pottery near the city of Santa Fe.

PARAGUAY

Linné (1936) describes an urn from Paraguay decorated with finger scallops (corrugated) and discusses the distribution of the type in a short paper.

URUGUAY

Fontana Company (1936) has prepared a detailed description of a decorated clay pipe with a thorough discussion of the distributions. Serrano (1936) has published a monograph on the ethnography of Uruguay, in which he incorporates his extensive archaeological observations.

BRAZIL

An introduction to the archaeology of Brazil by Costa (1934), an article on the pre-Columbian cultures of the Amazon by Mordini (1934), and a review of the work of Dr. Lund by Mattos (1935) are the only references at hand to recent work in Brazil.

VENEZUELA

Nomland (1935) has continued her work on Venezuela archaeology with this paper on new sites from the state of Falcón.

In this paper I have summarized the recent archaeological work in South America by utilizing the published articles which have come to

my attention. Obviously I must have overlooked many important contributions. I would appreciate any information on articles omitted, so that I may incorporate them in subsequent supplements.

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ASSOCIATION OF MAN WITH PLEISTOCENE MAMMALS IN THE SANDIA MOUNTAINS, NEW MEXICO

FRANK C. HIBBEN[184]

A CAVE deposit in New Mexico has recently been discovered which seems to combine all the favorable circumstances under which the association of man with extinct mammals may be conclusively demonstrated. In the fall of 1935, one of the students at the University of New Mexico reported to the Department of Anthropology that he had located several caves in the Sandia Mountains east of Albuquerque. He also produced such tangible evidence of archaeological remains found on the floor of the caves that an investigation was initiated to survey these and other previously reported caves. Most of them, as might have been expected, indicated but slight occupation of man, recent or ancient. One, however, has yielded evidence which forms another link in a long chain of evidence concerning the presence of Pleistocene humans in North America.

The Sandia Cave, as this particular one has been named, is located high on the east side of Las Huertas Canyon, which cuts through the north end of the Sandia Mountains. The limestone strata, which over the whole of the Sandia uplift form a capping for the intrusive granite beneath, are at this point comparatively close to the canyon floor. The strata dip sharply towards the east, following the general contours of the uplift which formed these mountains (Figure 14). The mouth of the cave is small and can be reached only by a difficult climb from the ledge beneath it. The cave itself is typical of limestone cavities all over the country. Formations in the Sandia Cave, however, are few and confined almost entirely to "curtains" or sheets of calcium material on the sides and the floor. Its open length at present is some 127 yards, and in only a very few places may a person stand erect. The fill, when the cave was first discovered, completely blocked the entrance.

The Sandia Cave is not imposing when compared with the many huge and wondrous cavities to be found in limestone formations elsewhere in the Southwest. However, during the initial survey by the University of New Mexico party, a bit of bone was scuffled from the cave floor. This bone was the claw core of a Nothrotherium or great ground sloth. Immediately Sandia Cave took on a new importance. If the bones of Pleistocene mammals were in evidence, perhaps there

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would be an opportunity of checking on the coexistence of man with these extinct mammals. From the surface, about eighty yards from the mouth of the cave, were recovered the teeth of horses, camels, mastodons and many carnivores, all of which appeared to be Pleistocene in origin. Evidence of human occupation was also scattered somewhat sparingly throughout the cave. As this evidence was on the surface, it had little chronological value.

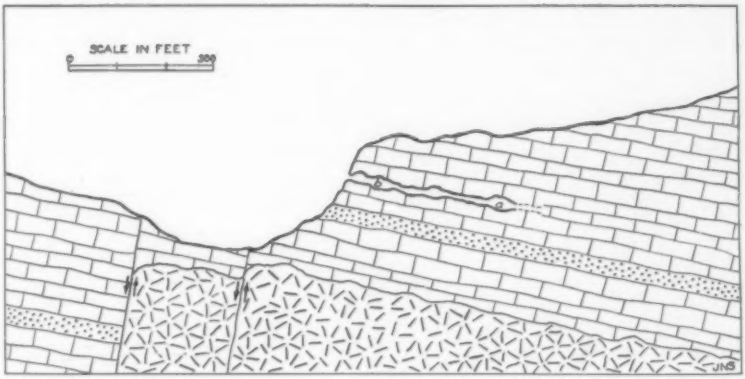

FIG. 14.—Sandia Cave, Las Huertas Canyon, Sandia Mts., New Mexico.
a-Position of the first flint point; b-Position of the firepit.

Excavation began in February, 1936. The cave was laid off into meter sections for its entire length, and the original level of the fill, rocks and other surface features was indicated on the cave wall in white paint. The cave was carefully surveyed with transit, plumb and level. A portion of the original fill was left intact on the north, or left hand side as one enters, to serve as a check for future investigation. Stratigraphic sections were taken at intervals of one meter, and when objects were encountered, every half meter. All objects discovered in place were exactly located from meter lines. Excavation was started at both ends of the cave, progressing towards the middle, since the width of the working space is so narrow that not more than two excavators can work in a given sector at one time. All of the refuse was screened by sections and according to its separate stratum. To date, seven meters have been excavated in the front or west end of the cave, and five meters in the back, to bed rock in each case.

The first discovery of importance was made in the back or eastern

excavation. Here the fill of the cave was not deep. Beneath a top layer of five to eight inches of accumulated dust is a well-defined cave floor, packed hard. This layer evidently represents some antiquity in spite of its shallowness, for there are a few stalagmite droppings on its surface, indicating moisture, although at present the whole section is absolutely dry. This floor is composed of rubble of all sorts, broken pieces of limestone, disintegrated limestone, clay, dirt, cherty concretions and pieces of yellow ochre. The layer below the original cave floor is nowhere over a foot in thickness, and is consolidated into one mass by infiltrated calcium or some similar substance in solution. This appears in the form of minute crystals on the exposed face of the layer. Below this cave-floor are several strata composed entirely of yellow ochre, very evidently water deposited, which continue sterile and unbroken to the bedrock of the original cave. In the consolidated breccia or cave-floor level there was found in the second, third and fourth meters, several bones of Pleistocene origin, firmly cemented into the mass by the crystallized infiltrate. Among those identified were horse, camel, and mastodon bones. Almost exactly on the fifth meter, and but two inches from the fragment of a horse tooth, was found a flint implement also consolidated in the breccia (Plate 17, Figure 2). The implement, although still embedded in the matrix, appears to be a rather large flat blade, approximately three by three inches, chipped roughly but certainly, and heavily patinated on its chipped surfaces (Plate 18, Figure 1). The piece was examined *in situ* by Drs. D. D. Brand and S. A. Northrop, of the departments of Anthropology and Geology, respectively, University of New Mexico, and Dr. Chester Stock of the California Institute of Technology.

The significance of this chipped point seemed open to some doubt, due more to the shallowness of the deposit than because of uncertain association. Just before the close of this season's work, a find was made in the front of the cave which added greater weight to the evidence so far collected. The strata near the entrance of the cave differ somewhat from those in the back. On the surface there is a layer of some fifteen to eighteen inches of debris largely composed of bat guano, pack rat dung, leaves, sticks and human accumulation of comparatively recent origin. A metate and several worked bones were found in this layer. Beneath this is a hard surface of calcium carbonate or similar material which varies from one-half inch to three inches in thickness. This is absolutely unbroken over the whole of the cave floor and successfully resists the blow of a pick. A sledge was used to remove this layer in pieces. Beneath the hard crust is a stratum of varying thickness, for the most part com-

FIG. 1. Workers in the mouth of the Sandia Cave.

FIG. 2. The first flint point, photographed *in situ*.

FIG. 1.—First flint point, embedded in matrix. One-half actual size.

FIG. 2.—Second flint point, found near fireplace near front of cave. Once and onehalf actual size.

posed of slightly damp soft brown dirt. This, in places, overlies the original rock surface of the cave floor, and in other sections, small lenses of white disintegrated limestone clay which lie in the original water channel on the floor of the cave. The layer of brownish dirt beneath the calcium carbonate crust is very thickly mixed with bones, almost all of which are in small fragments. However, considering the few meters already excavated, large numbers of definitely Pleistocene fragments, most of which are teeth, have been found. The hard crust separates the recent deposit from the one which is apparently of much older origin. On the seventh meter from the plumb at the entrance was found what appears to be a fireplace laid directly on the whitish clay of the extreme bottom of the cave and covered by the brownish deposit of dirt and the calcium crust, which still covers it almost completely. The fireplace is roughly outlined by small rounded boulders, apparently waterworn and burnt, and completely differing from the angular fragments which are usual in the cave debris. A small area between the stones is filled with a deposit of finely powdered charcoal which is spread to some distance on all sides of the original fireplace. Within the charcoal was found a burnt-bone fragment similar to the other Pleistocene bones, and the mandible of some large herbivorous animal. At the edge of the fireplace was another chipped implement, also apparently showing the marks of fire. This implement, representing a most unusual type, especially in this vicinity, is a large straight-shafted point with a side notch at the base after the Solutrian manner. The chipping, however, is not as fine as in European specimens of this type. The material is a gray cherty flint which does not occur, so far as is known, near the Sandia Mountains (Plate 18, Figure 2). The firepit was also examined by Dr. Chester Stock, who removed the mandible and the flint point from their original positions. All bone materials are being identified by him at Pasadena.

As a result of the excavation of the Sandia Cave, there are several problems requiring solution and several contentions in need of verification. One of the foremost problems is certainly that of the difference in stratification between the front and rear of the cave. Another outstanding one is that of the appearance of Pleistocene material on the surface of the fill some distance back from the entrance. The definite association of man with Pleistocene remains cannot be made absolutely certain before the complete excavation of the cave and the final compilation of data. The evidence so far is extremely interesting and undoubtedly presents new angles to the Pleistocene problem. Further excavation may enable students to tell the complete story.

FIG. 2.—Second flint point, found near fireplace near front of cave. Once and one-half actual size.

FIG. 1.—First flint point, embedded in matrix. One-half actual size.

A STONE CARVING IN BAS-RELIEF FROM THE UPPER GILA AREA

P. H. NESBITT[185]

THE STONE carving in bas-relief pictured herewith (Plate 19) was found during the summer of 1936 by the writer while in the course of conducting archaeological explorations at Starkweather ruin in the Reserve district of the Upper Gila area, New Mexico. Newspapers learning of this rather unusual find sensationally spread the story throughout the country that Aztec and Toltec art objects had been found in New Mexico. It is really amusing to note how they jumped at conclusions, for there is nothing in the find that would indicate any relation to the Aztec or Toltec. The writer hopes that all such inaccurate information will be corrected through the following description of the find and the conditions under which it was made.

The Starkweather ruin is located on the Apache National Forest in Catron County, about five miles south of the village of Reserve. The Logan Museum of Beloit College excavated this ruin during the summer months of 1935 and 1936, completing the work at the close of the latter season. The ruin is of the small house period containing thirty-two rooms, of which twenty are pitrooms, and twelve rockhouses or surface rooms. Two, and possibly three, periods of occupancy are represented. The first occupants of the site, which is located on an irregular hill-top overlooking Starkweather canyon, were those who lived in pitrooms with lateral entrance, did not employ stone masonry, and had pottery resembling that reported by Dr. Haury[186] for Mogollon Village, and to which he has assigned the Mogollon culture phases of Georgetown and San Francisco. Haury's study of these phases produced tree-ring dates covering the period 850 A.D. to 900 A.D. Overlapping this occupation and following it, the site was occupied by peoples who built stone houses above the surface of the ground, and in many cases directly over earlier pitrooms, constructed stone and adobe walls and hearths, buried their dead occasionally below the floors or, more frequently, in a refuse pile to the east of the village, used roof entrance to the houses, and manufactured pottery of classic Upper Gila type. This phase I

[185] Curator, Logan Museum, Beloit College, Beloit, Wisconsin.

[186] Haury, Emil W.: The Mogollon Culture of Southwestern New Mexico. Medallion papers no. XX. April 1936. Gila Pueblo, Globe, Arizona. (Note: Since this article was written, two tree-ring dates, both 927 A.D., have been determined for the Starkweather Pitroom stage. Identification of dates by Gila Pueblo.)

Sculpture in bas-relief from Upper Gila area, New Mexico: *in situ* in doorway (upper); detailed view (lower).

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have termed the Upper Gila Classic, and it is contemporaneous with, and possibly somewhat earlier than, the classic Mimbres which has been dated 1100 A.D.

The stone-carving belongs to the classic phase of Starkweather occupancy and was found with the carved face down on the floor of stonehouse No. 8. Sherds found on the floor of this room were without exception of Upper Gila Classic type. Stonehouses No. 8 and No. 9 were connected by means of a narrow doorway, and the position of the carved sandstone block suggests that it was employed as a seal-stone to close the passage, when necessary, between the rooms. With the disintegration of the roof and the upper walls it was forced out of position and fell to the floor.

The carving is that of a male figure and is on a rectangular slab of laminated sandstone. The slab is 42.5 cm. ($16\frac{3}{4}$ inches) in length, 31 cm. ($13\frac{1}{4}$ inches) in width and 5.5 cm. (2 inches) in thickness. The borders have been carefully dressed and beveled, and the underside regularly faced. Both chipping and pecking appear to have been employed in producing the figure. The relief ranges in height from 1.4 cm. to 1.6 cm. ($\frac{3}{8}$ inch to $\frac{1}{2}$ inch). The figure, with right arm and hand raised in "Nazi salute" fashion, impresses one as being simply executed and comparable in lines to a drawing which might be made by a grade school child. Proper perspective is lacking and the head is indicated in simple style, being almost moonform. Yet the creator was thorough in details as verified by the eyes, nose and mouth, and the fingers of the extended right hand. Due to the age and softness of the stone, as manifested in the weathering it has undergone, some of the details are partially obliterated. The writer has noted that the drawings of nude male figures which appear on Mimbres bowls invariably show the arms and hands in much the same positions as they are here, at the pelvis and above the head.

Carving in stone, especially the bas-relief form is rare in the Southwest, and the writer has been unable to find anything in the literature comparable to this specimen. Small animal figures carved from stone are fairly common in some sections of the Southwest, particularly in the Mimbres Valley and the Upper Gila area. These are done in the round and constitute a class quite different from the bas-relief in question. Although bas-reliefs are common to Middle American cultures, there is not the slightest hint of Mexican influence in the Starkweather find. I believe it must be considered the workmanship of a specially gifted individual of the village.

What significance may be attributed to the subject, its execution and its use is difficult to state. It is possible that it symbolized a fertility cult, while on the other hand it might well have been the workmanship of the village idiot. However, the location of the bas-relief gives some hint as to its function. Room No. 9, because of its size, its fine masonry—which is almost Chaco in appearance, and its adobe bench along the west wall, was probably used for ceremonial purposes. As it was connected with Room No. 8, in which the carving was found, the carving may well have been a symbol to designate the ceremonial chamber. Its apparent use as a seal-stone in the doorway leading to Room 9 would support this belief.

NOTES ON CULTURAL RELATIONS BETWEEN ASIA AND AMERICA

N. C. NELSON[187]

THE ARCHAEOLOGY of Alaska has been coming to the front in recent years as the result of protracted activities chiefly on the part of the National Museum in Washington, the University of Pennsylvania Museum in Philadelphia, the Canadian National Museum at Ottawa, and the University of Alaska at Fairbanks. Some twenty years ago, through the efforts of Vilhjalmur Stefansson, the American Museum of Natural History had already obtained a large archaeological collection from Pt. Barrow and vicinity, which is at least partly published and which may conceivably have helped to stimulate this new interest. Whatever the case, now once more, as the result of relations existing for some time between the University of Alaska and the American Museum, several small archaeological collections have been brought to the writer's attention during the last three years. In one of these collections are certain specimens of more than ordinary significance because they appear to suggest definite cultural relations between Alaska and Mongolia, and therefore seem worthy of notice at this time.

All the collections in question come from the vicinity of Fairbanks, roughly speaking in central Alaska. One lot, mostly pseudo-artifacts, was obtained from a rich fossil-bearing muck, overlying a local workable auriferous gravel deposit, from which Mr. Childs Frick, one of the Museum's trustees specializing on Pleistocene fauna, has obtained several important collections. The other (and the principal item of concern here) was a miscellaneous collection of genuine artifacts recovered from a superficial habitation site accidentally discovered on the University campus in 1933, and partly excavated during the seasons of 1934 and 1935. The excavation was instigated and supervised by the University president, Dr. Charles E. Bunnell, and was done by Mr. John B. Dorsch, one of Mr. Frick's fossil collectors. Dr. Bunnell sent the material in two separate lots to Mr. Frick, who in turn allowed me the privilege of examination. In the 1935 April issue of *Natural History*, I published a brief note about the contents of the 1934 lot, and on the arrival of the second lot, late in 1935, intended to issue a more complete statement, but was delayed by the offered opportunity to go to Fairbanks to investigate the site. Circumstances prevented my visit, and

[187] Curator of Prehistoric Archaeology, American Museum of Natural History, New York City.

in the meantime Dr. F. G. Rainey, who is teaching anthropology at the University, has during the past summer done some more work on the site and may shortly render a full report. It seems fitting, therefore, that I should now publish the few fragmentary notes in my possession, together with some explanations and comments.

As stated, the site is located on the grounds of the University of Alaska, near Fairbanks. From Mr. Dorsch I have the information that it lies on the eastern edge of "College Hill," directly above and adjacent to a 75-foot bluff which descends steeply to the floor of the Tanana valley. It appears to occupy a roundish, nearly level area about sixty feet in diameter, and exhibits culture debris to a depth of about eighteen inches. Mr. Dorsch's 1934 excavation was a 12-foot wide trench, the material from which was screened to obtain all the artifacts. I have no information concerning the 1935 work.

The resulting two collections have been examined with some care, and the combined inventories, amounting to about 800 mostly fragmentary specimens, may be given in brief form as follows: miscellaneous pebbles and bowlders of no account as artifacts; 3 fragmentary and unidentifiable bones—one possibly human; 1 hammerstone (?); 1 oblong rubbing stone of reddish vesicular lava or volcanic tufa; about 500 raw angular flakes of small to medium size; 63 apparently used angular flakes; 77 angular flakes with more or less chipped margins; 2 oblong pointed flakes with marginal chipping; 1 chopping tool or scraper; 21 side-scrapers with straight, convex, or concave retouched edges and thick backs; 19 small and medium-sized end-scrapers (Figure 15); 3 biface blanks suitable for knives or spearpoints; 22 knives or spearpoints of which only 3 are complete; 3 arrowpoints respectively with straight base, simple stem, and side notches; 31 small semi-conical or polyhedral cores roughly prepared by cross-flaking and partly utilized for the production of slender prismatic flakes; and, finally, 29 small prismatic flakes derived from polyhedral cores (Figure 16). The raw materials used for the flaked and chipped artifacts include quartz, quartzite, basanite, chert, jasper, obsidian and moss agate.

The items calling for special comment at this time are the end-scrapers and the polygonal cores, together with the small prismatic flakes derived from them. My reason for calling attention to these particular forms is that the Central Asiatic Expeditions of 1925 and 1928 brought from Mongolia several thousand specimens of identically the same character, suggesting that we have here a possible specific proof of culture connection between Asia and America. A few descriptive de-

tails must suffice to bring out the points of resemblance, but for those who may wish to verify my claims, illustrations of the corresponding Mongolian specimens may be found in *Natural History*, 1926, opposite page 246.

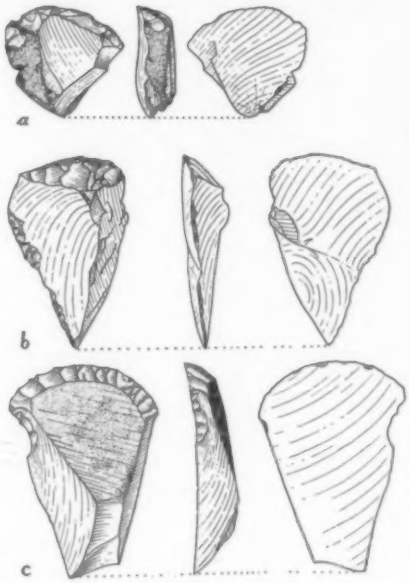

FIG. 15.—a, b, c. Three small end-scrapers, showing dorsal, ventral, and edge views. Natural size.

As indicated in Figure 15, the end-scrapers range in size from small to medium and are usually of subtriangular outline. They are made of more or less nondescript flakes, retouched as a rule only on the relatively broad convex bit end. As examples of an implement having nearly world-wide distribution, they are not unique, except perhaps as regards their relatively small size. In this respect they remind one strongly of the corresponding implement typical of Mesolithic times in Europe, though I am not now suggesting any direct connection. Moreover, their stratigraphic occurrence in Mongolia indicates that they actually belong somewhere near the Azilian-Tardenoisian horizon, for they appear first in a number of distinctly Pre-Neolithic sites.

The semi-polyhedral cores, illustrated by three examples in Figure 16, are of still more interest. The general form is known to have wide distribution. It is found in various parts of Europe and Asia; it is typical of Mexico and other parts of Middle America; it occurs at least sparingly in Ohio; and it is said to have been found in Montana and Oregon. An examination of the Eskimo and related literature indicates that it is found occasionally in the Aleutian Islands and even in Greenland.[188] Theoretically it should be found in Europe back to Aurignacian times, and it should be present, for example, in the Admiralty Islands, Australia, and South Africa, judging from frequent occurrences there of long prismatic flakes that must have been struck from such cores. However, as far as observed, these widely distributed cores, with one exception, are all of the nearly finished or exhausted form; that is, they are specimens which have been flaked down to a more or less symmetrical cone shape, round in cross-section and laterally fluted, wherefore the name "polyhedral" core. The exception is the mass of large flint cores found at Grand Pressigny, Dept. Cantal, France. These French cores are of late Neolithic date but are particularly instructive because they demonstrate on a large scale the unique, or at least the essential characteristics exhibited on a rather small scale by the Mongolian and Fairbanks cores; i.e., they show the mode, though not the exact order, of preparation and flake production from beginning to end

Referring to the large French cores, the selected oblong crusted nodule was prepared, for one thing, by the removal of a transverse spall from one of the rounded ends, which yielded the flat surface intended to serve as a striking platform. For the other preparatory step the body of the nodule was denuded of crust, that is, was flaked transversely all over on both faces, the result being a long, roughly celt- or tongue-shaped affair with two (sometimes three) thin lateral margins. In other words, the cross-section of the fully prepared core was usually double convex. The final step was the removal of the desired longitudinal flakes, which was done presumably by indirect blows delivered near the edge of the striking platform, the first flakes to be removed being those embodying the thin lateral core margins where the least resistance was offered. Once the flaking process was successfully started, flakes were by degrees removed from all around the block until the latter was reduced to more or less conical form. Although the Alaskan and Mongolian cores, unlike the French forms, are small, in some cases

[188] O. Solberg, *Vorgeschichte der Ost Eskimo*, p. 39

almost minute, they exhibit as a general rule the same three stages of manipulation; viz., the striking platform, the transverse preparatory flaking, and the lateral fluting. It must be emphasized, however, that

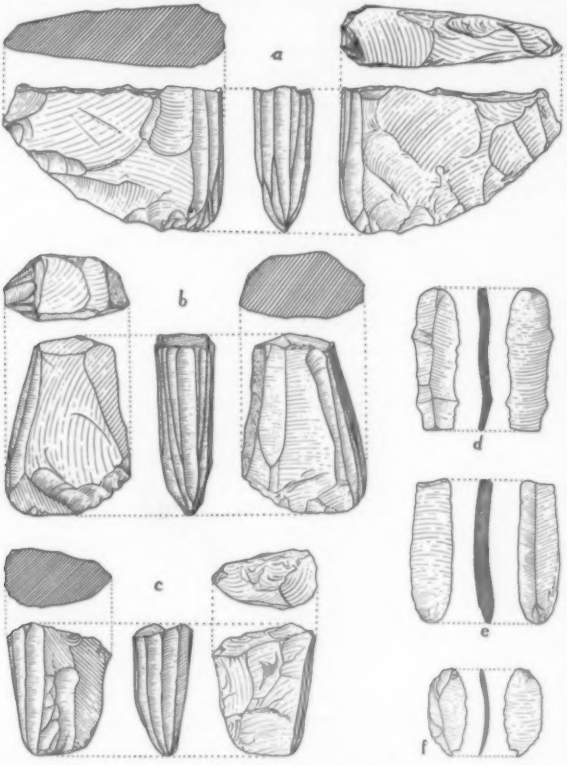

FIG. 16.—a, b, c. Three small semi-polyhedral cores showing both facial and edge views, also striking platforms and cross-sections. The facial views show some preparatory cross flaking; the edge views, the fluted flake beds.

d, e, f. Examples of prismatic flakes removed from above cores, showing upper, lower, and edge views. Natural size.

the Alaskan-Mongolian cores are in most cases not derived directly from complete nodules but from nondescript spalls perhaps already provided with a thick flat edge serviceable as a striking platform with-

out much additional preparation. In fact, in the case of the few Alaskan specimens available, the two stages of preparatory work, while present, are not nearly so carefully done as is true for most of the Mongolian specimens.

If I have drawn on outside sources for comparative material and have gone into some detail in describing the origin and development of these core forms, it has been because it is precisely in these revealing preparatory steps that the Fairbanks and Mongolian cores are alike. Also it is with respect to these preparatory steps that the cores under consideration differ from those found elsewhere. It is true that the Fairbanks cores are comparatively crude, none having reached the final or conical stage. Also it is entirely possible that the finished Ohio and Mexican cores may have been prepared in exactly the same way; but so far I have found no evidence to prove it. Whether or not this means that there is some close connection between the Mongolian and Alaskan core makers, only additional field work can demonstrate, but the detailed similarities here pointed out look remarkably promising.

A few examples of the type of flake removed from the Fairbanks cores are also shown in Figure 16, but these scarcely merit comment. This is especially true in view of the fact that while these often minute flakes were the things desired, only a very few of them, either in Alaska or Mongolia, have been subjected to secondary chipping or shaping. The few exceptions, for Mongolia alone, resulted in delicate forms of implements that can only be characterized as perforators and end-scrapers. For the most part the thousands of broken specimens found in Mongolia are without retouch, and their purpose consequently is a matter for speculation. It is to be hoped that Dr. Rainey may be able to throw some light on all aspects of the subject.

THE CHRONOLOGICAL POSITION AND ETHNOLOGICAL RELATIONSHIPS OF THE FORT ANCIENT ASPECT[189]

JAMES B. GRIFFIN[190]

THE SITES of the Fort Ancient aspect of the Upper Mississippi Phase are located in southern and southwestern Ohio, northern and northeastern Kentucky and southeastern Indiana. It is the purpose of this paper to present the grouping of the individual components within the larger cultural unit; to state briefly the chronological position of the Fort Ancient aspect; and to discuss the possible ethnological connections.

The existence of many of these sites has been known for years, and their cultural similarity has been recognized since the beginning of the twentieth century. Two years ago the writer began a study of the Fort Ancient sites with the intention of determining the smaller groupings and of working out the determinant traits of the culture. An examination of the published reports and of the artifacts gathered in various museums indicates that there are four localized culture groups each of which has a higher degree of similarity within itself than it has to the Fort Ancient aspect as a whole.

These four foci I have called Baum, Madisonville, Feurt, and Anderson. Each focus contains a number of individual components. The Baum focus includes the Baum and Gartner components and the village site at and near Serpent Mound. The components making up the Feurt focus are found at the Feurt, McCown, and Blennerhassett sites, located in southern and southeastern Ohio. The Madisonville focus contains the largest individual sites and the largest number of components. Madisonville, Turpin, Sand Ridge, Hahn, and Campbell Island are in southwestern Ohio; Fox Farm, Fullerton Field, Larkin, and Buckner are in northern and north central Kentucky; and the Aurora village site is in southeastern Indiana. The Anderson focus includes the Fort Ancient village site at the base of the Fort and the Oregonia, Middletown, and Steele Dam components. While the above list probably does not contain all of the individual sites, I believe that few, and probably no large components, will be found outside of the area just delineated. I would consider inaccurate earlier statements regarding the presence of Fort Ancient sites further down the Ohio to its mouth, or in Tennessee, West Virginia or Virginia.

[189] Read before Section H of the A.A.A.S., Rochester, N. Y., June, 1936.

[190] Ceramic Repository, University of Michigan, Ann Arbor, Michigan.

With the geographical distribution of the culture clearly in mind, we can proceed to its probable chronological position in eastern American archaeology. It has been stated by Mills, and later by Shetrone, that Fort Ancient has been found intrusive in Hopewell, and also that, at the Robert Harness mound, a Hopewell cremated burial was found intrusive into the Fort Ancient mound. This identification of the Robert Harness mound as a Fort Ancient component does not seem to be justified on the basis of the traits listed by Mills. It would appear rather to belong to a Woodland group, perhaps Adena. In the Tremper mound, several intrusive Fort Ancient graves were found both before and during Mill's major excavation at that well known Hopewell site. Material in the Peabody Museum leads me to believe that people of the Adena aspect (?) were intimately connected with the construction of Serpent Mound, while the later occupants can be culturally identified with the Baum focus of the Fort Ancient aspect. Trade material showing contact with Europeans has never been found in Hopewell or Adena mounds, indicating that the mounds and village sites of these cultures in the area under discussion were almost certainly pre-Columbian.

On the other hand, the Madisonville component was occupied in post-Columbian times, for trade material was found in a small per cent of the graves containing typical Fort Ancient material. Webb believes that a number of bear canines, with incised crosses, found at Fullerton Field, may indicate white influence. Parker in his *Archeological History of New York* illustrates two Madisonville focus pottery vessels that were found on the Dann site, Honeoye Falls, New York. This site he attributes to the Seneca of about 1660–1690. In New York State, a Madisonville focus guilloche design on a pottery disc was found in Jefferson County, and at the Burning Springs site other Fort Ancient sherds have been located. The occurrence of pottery which can be attributed to the Fort Ancient culture, or to its influence, seems to be limited to a fairly definite period in New York history; namely, from about 1650 to 1700.

The Iroquois of this period were able to conduct extensive and profitable raids into the area southwest of their homes, and Ohio was not safe for any Indian groups from about 1675 on. There has been considerable discussion as to the identity of the Indian occupants of southern Ohio in prehistoric and protohistoric times. There is some evidence which indicates that Iroquoian tribes occupied Ohio quite a distance south of Lake Erie, and that they were destroyed by the Five Nations after the defeat of the Erie. As nearly as can ascertain,

Shawnee groups lived in southern Ohio at least until 1675 and helped the Andaste in their fight with the Iroquois. The Indian village at the mouth of the Sciota visited by Arthur, in 1673, is thought by Alvard, Bidgood and others to have been Shawnee. Probably at this time, as well as later, the main Shawnee group lived in western Kentucky. Yet when they were driven out by the Cherokee and Chickasaw, they settled in southern Ohio.

The Miami were considered to be the owners of western Ohio in the early treaties, and other tribes were treated as interlopers. The Big and Little Miami rivers in southern Ohio take their names from this tribe. Shetrone believes that the protohistoric tribes of southern Ohio belonged to the Central Algonkian group and attributes the Woodland archaeological remains to them.

Swanton has recently published material which has led him to believe that at least the Madisonville site is probably the remains of a village of Siouan-speaking peoples. I will not review his discussion in detail. It is an interesting hypothesis, but I feel it must remain in that unproven category for some time. Franquelin's map of 1684 located eight Mosopolea villages, destroyed by the Iroquois, somewhere in what may be southern Ohio. No exact identification of the sites is possible. Franquelin probably obtained his information from La Salle who did not go near the area in question. If the group encountered by Marquette in 1673, on the east bank of the Mississippi just below the Ohio, were Mosopolea, they possessed guns and had evidently been in that general region long enough to prevent the Quapaw from trading down river with the whites.

In 1908, the last surviving member of the Ofo gave Swanton a list of words which belong to a Siouan dialect intimately connected with Biloxi, more distantly with Tutelo and Dakota, and quite far removed from Dhegiha and Chiwere. Swanton believes that the Ofo are the same group as the Mosopolea, who were last heard from as a very small group encountered by La Salle in the spring of 1680 in a Taensa village in Louisiana.

The migration legends of the Dhegiha Sioux quite clearly locate their former home along the Ohio from its mouth as far upstream, perhaps, as Louisville. Father Douay, who passed the mouth of the Ohio in the fall of 1688, in speaking of that river, says: "The Akansas were formerly stationed on the upper part of one of these rivers (the Ohio), but the Iroquois drove them out by cruel wars some years ago, so that they with some ge villages were obliged to drop down and settle on

the river which now bears their name and of which I have spoken." Swanton and others suggest that the whole Ohio valley was the prehistoric home of the various Siouan groups and that the eastern, southern, western, and northwestern historic homes of the Siouan peoples represent a relatively recent movement from this valley as a central point of dispersal.

The one serious difficulty encountered in attempting to identify the Fort Ancient culture with the Shawnee, Miami, Mosopolea or any other historic tribe in the Ohio-Kentucky region is that we simply do not know the nature of the material remains occurring at documented village sites of any of these peoples. Identifying an archaeological culture with an ethnological culture or tribe is a serious and painstaking procedure. It should not be done until practically every reasonable doubt is removed. I must confess my inability to relate, on the basis of present evidence, the Fort Ancient aspect to any known historical group or groups.

When and if such an identification is made, I should expect to find that the carriers of the Fort Ancient culture had had many contacts with neighboring archaeological cultures. In the northern foci, the dividing line between Fort Ancient and early or undifferentiated Iroquois is very indefinite. The eastern and southern foci show some characteristics, particularly in the pottery, which also appear in the Piedmont area of Virginia and in the Kanawha valley. In the southwestern portion, around Madisonville, there are a number of traits which link this focus culturally, and perhaps temporally, with certain Upper Mississippi sites in northern Illinois. The same conclusion can be drawn regarding certain Middle Mississippi groups down the Ohio river. Middle Mississippi and "Tennessee-Cumberland" traits appear occasionally in Kentucky. At all of the Fort Ancient sites there are traits which appear more commonly on Woodland sites. In other words, cultural forces influenced the Fort Ancient peoples from all directions, so in seeking to identify them, I should look for a people, tribe or tribes, who were in a sense marginal to both the southern and northern areas.

THE PRESERVATION OF TEXTILE REMAINS

J. D. LAUDERMILK[191]

IN THE course of certain investigations on the identification of cloth ash,[192] it became necessary to develop a technique whereby relatively large (5 to 15 cm.) fragments of ashed cloth of all types woven from vegetable fiber could be permanently preserved.

The requirements were that the preparations should be capable of withstanding the relatively rough handling of the laboratory. They should show the textile remains displayed flat with the yarns of the warp and weft in their original relations. The samples should be so mounted that both sides could be studied with the microscope.

Characteristics of Ashed Fabrics. The ash of a textile woven from vegetable fiber is generally an extremely fragile substance. The relative durability of such material is greatly influenced by the presence of sizing and weighting in the original cloth. The mordants used in dyeing, should such be present, would also have some effect. Generally, however, the ashed residue will stand but very little handling without collapsing to an impalpable powder which furnishes but little evidence as to the original nature of the cloth from which the ash was derived. Some indication of the type of fiber, whether that of cotton, linen, jute, or other material, may be furnished by the examination of such powdery residues, but this is about all. Where the cloth has been merely carbonized, the preservation of the carbon web presents no serious difficulties, but in the event of complete incineration where only the mineral constituents of the fibers remain, the residue is extremely fragile. It is for the latter class of residues that the technique was developed.

Literature Concerning the Preservation of Ashed Residues. The literature on the subject of ash preservation is meager, and what little there is is hard to come by. References related to the present subject are to be found in the works of Lucas,[193] Mitchell,[194] Matthews,[195] and more recently the work of Sodermann and O'Connell.[196]

[191] Pomona College, Claremont, California.

[192] Laudermilk, J. D., The Identification of Cloth Ash. Journal of Criminal Law and Criminology: July–Aug., 1933, pp. 503–515.

[193] Lucas, A., Forensic Chemistry and Scientific Criminal Investigation, pp. 133–136.

[194] Mitchell, C. A., Documents and their Scientific Examination, p. 83.

[195] Matthews, C. G., Treatment of Parchment Damaged by Fire, Analyst, XLIX, page 516, 1924.

[196] Sodermann, Harry and O'Connell, John J., Modern Criminal Investigation, 1935.

In these cases the references are to the preservation of ashed and charred documents. With such materials the presence of size and filling, and the very nature of the material itself, go far toward making the problem a less difficult one than is the case when dealing with ashed cloth, since, weight for weight of original material, cloth generally leaves a much lighter residue than does paper. Of course there are exceptions since a heavily mordanted canvas or duck would be very likely to leave a heavier ash than would the same weight of paper lightly sized and filled and made from mechanical pulp.

Lucas, Mitchell and Matthews recommend, in the case of the materials with which they dealt (ash of paper, parchment and papyrus), that the fragments should be inclosed between two plates of glass held together by passe partout. In other cases they suggest that the fragments may be fastened to a cardboard backing by means of an adhesive. Neither of these methods is suitable in the case of cloth ash, or presumably in the case of badly oxidized fabrics from ancient deposits.

A defect of the first method of preservation is that any pressure upon an ashed fabric sample immediately crushes it out of all semblance to a woven textile. Cloth ash mounted in this way, if not absolutely ruined during its preparation, would eventually be entirely spoiled in handling. In the second method only one side of the preparation can be examined. Moreover, hygroscopic moisture, which is the natural enemy of cloth ash, combined with the flexibility of the cardboard would soon ruin the preparation, in case the adhesive had not already accomplished that result through surface tension.

A solution of celluloid in acetone, as recommended by Lucas, was tried when dealing with cloth ash and found to be about the least satisfactory adhesive. This material shows a considerable tendency to shrink in drying, which is a fatal defect. Numerous other commonly used adhesives were tried but all presented certain defects. Some dried so slowly that the ash was gradually pulled apart in the process. All aqueous media are banned automatically since the alkaline base of vegetable ash passes easily into solution in water.

The ideal material was one which would be perfectly fluid when applied, which would be perfectly transparent, and which would dry rapidly with the formation of a damp-proof film just sufficiently sticky to hold such a light, fragile web as cloth ash firmly in place. The adhesive should dry to a hard surface which would neither chip nor crack. These conditions are fulfilled by a solution of 40 grams of clear rosin in 100 cubic centimeters of acetone.

Technique. The actual method of making the adhesive is extremely simple. A good quality of lump rosin[197] is ground to a moderately coarse powder, perhaps 20 mesh. A weighed quantity is placed in a wide-mouth bottle closed with a screw cap (a glass stopper is very difficult to remove, and corks yield contaminating fragments). The required quantity of acetone is added. On shaking, the rosin soon goes into solution. The solution is allowed to stand for half an hour. When all the sediment has settled the clear solution is decanted off into a second screw cap bottle for use.

The other instruments required are equally simple. (1) A thick glass or porcelain slab about one foot square. (2) Five or six glass rods about four inches long and drawn out to rigid points. The ends of the rods should be evenly rounded but should not terminate in a globule. Two of these rods should be bent to an angle of 45 degrees. (3) Two spatulas about half an inch wide and a third spatula about an inch and a quarter wide and eight or ten inches long. (4) One or two soft cow-hair brushes about an inch and a half wide for spreading the adhesive.

Collecting and Mounting the Samples. Commonly, it is necessary to collect and mount the samples of ash while in the field. The material may be in almost any condition, and dirt and bits of charred or decayed wood may adhere to the ash or rotten fabric. The first thing to be done is the removal of all contaminating material. This is best accomplished by the use of fine pointed forceps. To unfold a sample, a point is chosen where a layer of the material is loose enough for the small spatula to be inserted, the spatula is gently raised and the sample spread out in whichever direction offers the best possibility. When a typical fragment of the sample has been loosened, this is cut free from the unavailable material by means of a second spatula which is pressed firmly, straight edge downward, on the ash supported by the spatula beneath. This is more of a crushing or breaking than an actual cutting. The sample is then lifted onto the mounting slab with the broad spatula. It is next coaxed into position by means of the glass rods, with the aid of a spatula if necessary. In no case should the forceps be applied to the specimen, nor should any attempt be made to drag it into position, since this will almost invariably cause the piece held to break off.

Making the Permanent Mount. When the sample is in place on the slab, a thin glass plate (blank photographic negative or lantern slide)

[197] Powdered rosin, as commonly met with in commerce, is so frequently of inferior quality that the product is nearly always cloudy. Much of the commercial rosin powder has been found to contain talc, powdered gypsum or kaolin.

is smoothly and evenly coated with a single layer of the adhesive. In about fifteen seconds, or sooner if necessary, the surface is ready to receive the sample. The sample is not removed from the mounting slab but the prepared plate, sticky side down, is carefully lowered until its surface just touches the sample. In most cases the sample will spread itself on the prepared surface. When this fails to happen no attempt should be made to flatten it out, but the plate and sample, supported face down by the edges, should be put aside until dry and the specimen treated as given under the treatment for thick specimens.

Treatment for Thick Specimens. Where the specimen shows considerable thickness, as is the case with some coarsely woven materials, it is sometimes necessary to treat the sample further. In such cases the sample is permitted to absorb enough of the adhesive to act as a skeleton or stiffening for the filaments of the ash. A solution containing half the quantity of rosin as that used to coat the plate is prepared by diluting the stock solution with acetone. This is applied with a medicine dropper held so as to nearly touch the sample while a drop of the solution is allowed to soak slowly into the material. The operation is continued until all dangerous areas have been treated. When the acetone has evaporated it will be found that the preparation is comparatively firm and shock-proof.

Finishing. All that now remains to be done is to finish the mount with a cell and cover. A piece of cardboard, previously soaked in shellac and dried, is cut to the same size as the plate upon which the specimen is mounted. A second rectangle, one-half inch smaller on all sides, is cut from the center of this, leaving a frame half an inch wide to act as a support for the coverglass. Naturally, this cell should be deep enough to support the cover without contact with the specimen. Paint a margin around the plate with the adhesive which is about the same width as the cell. Place the cell evenly in position. Treat the cover in the same way and lower it into position on the cell. Press the edges down evenly and wipe off any adhesive that oozes from under the cover; allow the mount to dry; give the edges three or four coats of shellac and, when this is set, bind the edges with passe partout. Specimens of cloth ash of all types, preserved in this way, have been sent long distances by parcel post and arrived in first-class condition, and after being knocked around the laboratory for the past four years, show no signs of crumbling or other deterioration. Photographs of four of these samples, both natural size and enlarged approximately six times, are shown in Plates 20–21.

FIG. 1

FIG. 2

FIG. 3

FIG. 4

FIG. 1. Ash of closely woven muslin. Natural size.
FIG. 2. Upper left corner of Fig. 1. ×6.
FIG. 3. Ash from canvas (duck). Natural size.
FIG. 4. Upper left corner of Fig. 3. ×6.

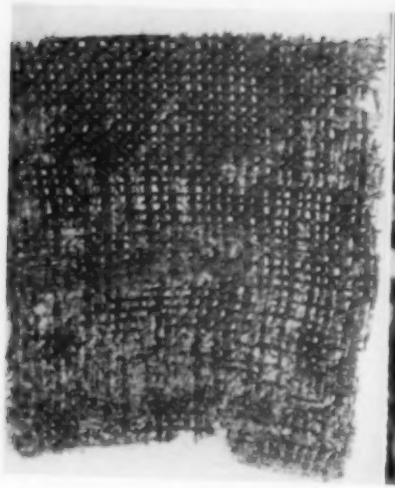

FIG. 1

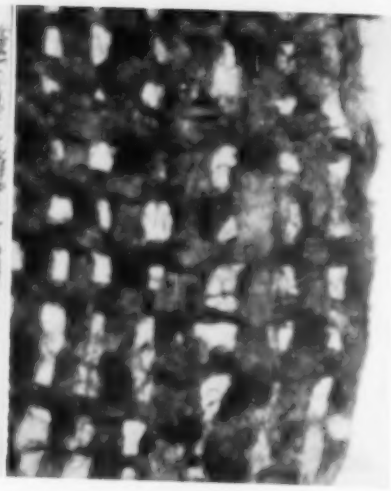

FIG. 2

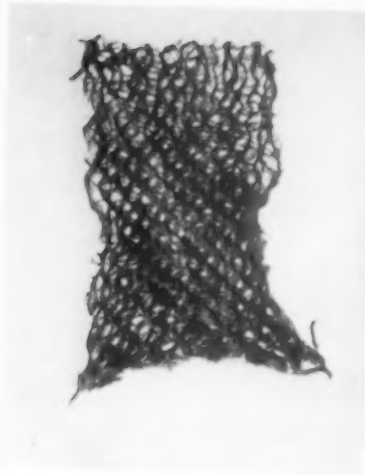

FIG. 3

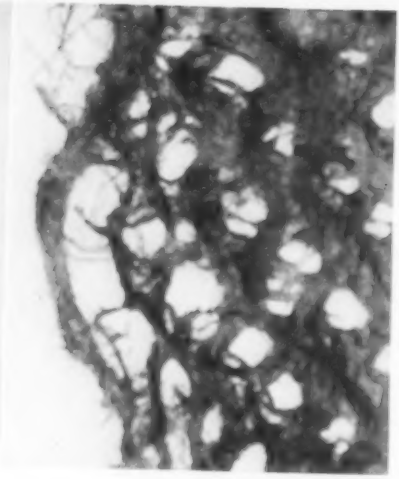

FIG. 4

FIG. 1. Ash of closely woven jute fabric (burlap). Natural size.
FIG. 2. Right center of Fig. 1. ×6.
FIG. 3. Ash of coarse burlap. Natural size.
FIG. 4. Left center of Fig. 3. ×6.

Attempts to fix the samples by means of spraying with the acetone-rosin solution were entirely unsatisfactory. In some cases large drops of the adhesive shattered the sample, and when a fine spray was used the acetone had so far evaporated that the rosin was not absorbed by the specimen.

In applying this method to the preservation of archaeological specimens, certain desirable features are apparent. The equipment necessary is very simple and the whole operation of making a permanent mount could be carried out on the site of the excavation. After a few experiments with the preservation of cloth ash, the technique is easily mastered and failure becomes the exception.

A PRE-SPANISH RUBBER BALL FROM ARIZONA[198]

EMIL W. HAURY[199]

IN THE winter of 1934–35, a ball-court, analogous in many details with those of Central America, was discovered at Snaketown on the Gila River Indian Reservation in south-central Arizona, during excavations conducted by Gila Pueblo. The announcement of a ball-court 1500 miles from its supposed origin,[200] and in a region where it was entirely unexpected, met with skepticism until the discovery was verified by men qualified to judge from first hand knowledge acquired in the Middle American field. A new angle to the problem of relationships of Southwestern, Mexican, and Central American cultures was thus brought to the fore. Now, to add to this discovery, comes another find in the form of a rubber ball. It, too, was found in south-central Arizona and may, indeed, have been used in the game for which the courts were built. As in the case of the ball-courts, the announcement of a ball made of rubber, antedating the Conquest, may arouse incredulity, but I record the facts here for the interested reader, firm in the opinion that the specimen is authentic.

For the actual finding of this ball, we must go back some twenty-seven years to the fall of 1909. Col. W. C. Greene, cattleman, was then constructing a long earthen dam to impound the flood water of the Santa Cruz River at a point a few miles south of Toltec, Arizona. As dirt was being moved from the west bank of the stream by means of scrapers, objects of Indian manufacture were turned up from what appeared to be an old village site. Among these was a jar containing a lump recognized as rubber by the workmen. Lloyd, in his treatise on Guayule, quotes Prof. R. H. Forbes concerning this specimen:[201]

"The lump of rubber, a portion of which I recently handed you, was found in December (or thereabouts), 1909, at the west end of the Santa Cruz Reservoir and Land Company's dam . . . Mr. C. O. Austin, who was present, states that this ball of rubber was contained in a small olla with articles of stone belonging to the older prehistoric ruins of this country. The find was made at about 3 feet below the general surface which was formed by the off-wash of an

[198] A preliminary notice of this ball, by Charles Amsden, will be found in The Masterkey, Vol. X, No. 1, pp. 7–8, Jan., 1936.

[199] Gila Pueblo, Globe, Arizona.

[200] Blom, F., The Maya Ball-Game Pok-ta-pok, Middle American Research Series, Publication No. 4, Middle American Papers, pp. 487–527, 1932.

[201] Lloyd, F. E., 1911, Guayule: A Rubber-Plant of the Chihuahuan Desert, Carnegie Institution of Washington, Publication No. 193, p. 6.

adjacent low mountain. No traces of houses on the present level of the land,[202] according to Mr. Austin, were visible. One other ball of rubber was found here, and is now in Col. W. C. Greene's collection at Cananea. I regard this find as genuine, as Mr. Austin is familiar with Salt River Valley ruins and his statements are confirmed by others."

The "other ball" mentioned is the specimen with which this article deals. It remained in the Greene collection until 1924, when it was presented to the Southwest Museum. There it lay until September 1935, when Mr. Charles Amsden of the Museum's staff and the writer chanced upon it while seeking other items of Hohokam origin. The potential value of this ball, if authentic, became especially apparent, in view of the fresh discovery of ball-courts, as it would assist in confirming the function of the ball-courts as well as in showing that the Indians of this region were familiar with rubber. My request for the loan of the specimen, so that a qualitative analysis of the rubber could be made, was granted without hesitation, a courtesy for which I am indebted to the Southwest Museum. Although we do not know exactly how the ball was found, none of the circumstances surrounding its discovery tend to throw doubt on its genuineness. However, an analysis seemed the best means of authenticating it; and, as will presently be shown, the analysis yielded nothing but confirmatory evidence.

A casual inspection would not enable one to identify the ball as anything but an uninteresting stone. Distorted out of round, probably by earth pressure (Figure 17), it has a maximum diameter of 86 mm. and a minimum diameter of 53 mm. Its present weight is seven ounces. The surface color varies from light to dark brown. This is partly due to an incrustation of lime, a patina possessed by most objects recovered from ruins in southern Arizona. While this is not a conclusive proof, it bears out the claim for antiquity. Oxidation of the rubber accounts further for the brownish color of the specimen. This process has formed a hard outer crust about 5 mm. in thickness which is finely seamed with cracks exposing a dark substance below. These cracks are largely the result of handling the specimen and squeezing it to test resilience. Surface contours, in general, are rough, probably caused by contact with hard particles in the soil. The blackish material beneath the crusted surface layer is rubber only partially oxidized, which still retains a surprising degree of elasticity. To test this material, the services of a rubber

[202] The lack of house remains on the surface is easily understood, as during the period represented by the find, houses were semi-subterranean and their presence is not manifested by surface features.

chemist were enlisted. Mr. C. A. Neville of the Product Control Division of the Samson Plant, U. S. Rubber Company, Los Angeles, California, kindly offered to undertake the examination, a coöperative gesture which is deeply appreciated. Results of the analysis, made by Mr. J. K. Fleshman, follow:

FIG. 17.—Two views of the rubber ball of pre-Spanish date found in southern Arizona. Maximum diameter 86 mm.

Details:

Extractable Waxes and Resins (Acetone and Chloroform Extracts)	17.7%
Rubber Hydrocarbon (Chloroform Extract and Bromine Equivalent)	42.5%
Ash	.9%
Organic Insoluble (Insoluble Oxides, Natural Plant Products, etc.)	38.9%
Sulfur	Trace
	100.0%

Analysis Details:	*Remarks*
1. Physical Appearance: Dark brown, odorless, tacky material with low tensile strength but quite elastic.	A rubber or rubber-like material.

2. Acetone Extract: (Extracted 16 hrs.)	
(a) Acetone containing extract was colorless while hot.	(a) Contained no pitch or similar substance.
(b) A very small amount of white material settled out of solution while hot and stuck to bottom of flask.	(b) Characteristic of sugars in natural rubber.
(c) A white, waxy material precipitated from the cold solution.	(c) Natural waxes or paraffine.
(d) Evaporation of acetone left a transparent, waxy material which had a sweet aromatic odor. Total extract—14.40%.	(d) Extract too great for Hevea rubber and too soft for Borneo origin; odor and appearance characteristic of extracts from North American rubber-bearing plants, although quantity less than would be expected.
3. Total Sulfur (Slight trace)	If rubber, it is not vulcanized; factice also eliminated.
4. Ash:	
(a) Upon heating, the substance melted to a thick, dark mass, and gave off an odor characteristic of burning rubber.	(a) Rubber present.
(b) Total ash was 0.88%. Analysis of ash showed calcium, aluminum, iron, and magnesium present.	(b) Calcium probably from soil in which material was imbedded. Magnesium characteristic of natural rubber.
5. Chloroform Extract:	
(a) Acetone extracted material extracted for four hours with chloroform. Solution remained clear. The extract was brown in color and had appearance of rubber. Total extract—24.2%.	(a) Characteristic natural rubber extract.
(b) Dissolved extract in toluol. 3.3% remained insoluble. Insoluble material was white, crystalline, and hard.	(b) Material dissolved in toluol apparently rubber. Insoluble material natural resins and waxes not soluble in acetone.
(c) Material dissolved in toluol was reprecipitated with alcohol. 29.9%.	(c) Further confirmation of rubber.

6. Treatment of Chloroform extracted residue:

(a) The residue had lost all tackiness and stretch, yet still had appearance of containing some rubber. Burning still gave characteristic appearance and odor of rubber.

(a) It is highly probable that the great age of the sample had caused oxidation of resins, waxes and rubber to products insoluble in either acetone or chloroform. These insoluble materials may also have occluded some of the rubber so that the established 4 hours was insufficient time to extract completely all rubber.

(b) The residue was treated with bromine to obtain an estimate of the rubber hydrocarbon. The estimate was made on the rubber tetrabromide precipitated in alcohol. 21.6% rubber obtained.

The remainder of the residue was acted on by the bromine to form insoluble materials. Whereas rubber tetrabromide is soluble in CCl_4, it was assumed that all tetrabromide dissolved by the CCl_4 and precipitated by alcohol was rubber tetrabromide and that the remainder was organic insoluble material.

Conclusions: The sample is a natural, unrefined, and unvulcanized rubber hydrocarbon containing resins, waxes, and organic insoluble materials in proportions similar to rubber obtained from rubber-bearing plants of North America. The exact botanical source of the rubber cannot be determined without a more exhaustive research, both of the sample submitted and of the rubber bearing plants, particularly those of southern United States and Mexico.

PRODUCT CONTROL DIVISION
U. S. Rubber Company—Samson Plant
C. A. Neville; per: J. K. Fleshman

The report leaves no doubt regarding the nature of the material of which the ball was made and its general origin, but the specific source

remains undetermined. Chemists were hesitant to undertake further work on this point because of the uncertain factors involved, such as the contamination of the rubber by the natives in its preparation,[203] which might lead to negative results. However, the problem has been stated by Dr. H. I. Cramer, Assistant Professor of Chemistry, University of Akron, who responded freely to many inquiries. Referring to the analysis made by Mr. Fleshman, Dr. Cramer writes:

"It will be seen that the acetone extractable material and other resinous products are unusually high, and the rubber hydrocarbon content correspondingly low. These facts may be explained: (1) by assuming that the sample was originally Guayule rubber which . . . is indigenous to Mexico and southern United States; (2) that the sample was derived originally from high grade rubbers such as Castilloa, which is indigenous to Central America and northern South America, or from *Hevea Braziliensis*, indigenous to the Amazon district, and has in the course of years undergone extensive oxidation."[204]

In the absence of specific data we must resort to speculation regarding the origin. Because of the great distance involved, South America may be eliminated as a source of rubber. Similarly, a Central American source, although plausible, seems unlikely. From the distribution of the main rubber-bearing plants, Guayule would seem to be the most likely source. The properties of this plant have been known for a long time to the residents of the region where it grows, and it is not assuming too much to say that this knowledge extended well into antiquity. Certain physical qualities of the rubber in the ball suggested a Guayule origin to Dr. Cramer, but without further analysis this, naturally, cannot be regarded as final.

Archaeologically, the rubber ball from the Santa Cruz site is unique. Of the thousands of rubber balls that must have been in use in Mexico[205] and Central America, no actual specimens seem to have survived. For northern Mexico, likewise, none have been documented; but for the Southwest, in addition to the example described here, Mr. Frank Pinkley, Superintendent of Southwestern Monuments, has informed the writer that a rubber ball was found years ago near Casa Grande National Monument. Unfortunately, this ball has disappeared.

[203] Oviedo, 1851, Vol. I, p. 165, describes the balls of Central America as manufactured "out of roots of trees and herbs and juices and mixtures of wax and pitch."

[204] By letter, January 8, 1936.

[205] " . . . In the Codex Mendoza we see that twenty-two towns located on the Gulf Coast between northern Oaxaca and the Gulf paid 16,000 rubber balls as tribute every year to the court of Mexico." Blom, F., *Op. cit.*, p. 498.

An appraisal of the cultural background of the ball rests on the associated material from the same site which reached the Southwest Museum in 1924. In a catalogue supplied with the collection, the ball and the objects were given the same origin. The artifacts, mainly pottery and shell, are identifiable as the products of the Hohokam culture. The nature of the pottery permits its allocation specifically to the Sedentary Period which may be roughly dated at 900–1200 A.D. Thus, we are entitled to state that the ball dates from pre-Spanish times, and that its age, in round numbers, may be placed at a thousand years. Although recent discoveries indicate that ball-courts antedate this period in the Southwest, we also know that they lasted through the Sedentary Period into the Classic Period (1200–1400 A.D.). This makes it possible to synchronize the age of the ball and the use of the courts, a necessary point in substantiating the assertion that the ball may have been used in the game played in the courts, as was the practise in Central America.

The archaeological significance of the ball is lessened somewhat by our ignorance of the exact source of the rubber. Although we do not ordinarily think of it as a domestic product, Guayule rubber was available to the Hohokam either by trade or expeditions to the Chihuahua desert, the nearest source. The fact that rubber balls were common to southern Arizona, Mexico, and Central America, along with ball courts, is in itself most significant. It argues strongly for a cultural connection of the several areas, the exact nature of which remains to be determined.

It is an interesting coincidence that, although this rubber ball was found twenty-seven years ago, and ball-courts might have been identified seventeen years ago, following suggestions made by Pinkley after his cursory excavations at Casa Grande, positive identifications of these two probably complementary traits were not made until 1935.

SOCIETY FOR AMERICAN ARCHAEOLOGY

ANNUAL MEETING, 1936

THE ANNUAL MEETING of the Society for 1936 was held in conjunction with those of the American Anthropological Association and the American Folklore Society, at the Carlton Hotel in Washington, D. C., on December 29, 1936.

The Council meeting was called to order by President Jenness shortly after noon on December 28, in the Carlton Hotel. The Fellows of the Society were invited to attend. Five Council members and about fifteen Fellows were present.

The minutes of the previous meeting were approved as printed in AMERICAN ANTIQUITY. The reports of the Editor and Secretary-Treasurer, which are appended to these minutes, were accepted as read.

Dr. Linton, a member of the nominating committee, presented the report of Dr. Haury, the chairman of that committee, which submitted two alternative slates of officers to the Council. It was moved, seconded, and passed, that the first choice of the committee be adopted and transmitted, with the list of Fellowship applications approved by the Council, to the annual meeting for action.

The secretary then read the proposed amendment to the by-laws which had been approved unanimously by the Council by mail, calling for the change of the official year of the Society. Following a brief discussion, it was moved, seconded and passed that this motion be approved and transmitted to the annual meeting for action.

Under the heading of new business, Dr. Roberts moved that "the President be authorized to appoint a program committee empowered to coöperate with those organizations with which meetings may be held in the future, and to adopt such rules as are needed to bring about uniform procedure at such meetings." This was seconded and adopted unanimously.

The secretary read communications received from Dr. E. B. Howard relative to the International Symposium on Early Man to be held in Philadelphia on the occasion of the 125th Anniversary of the Academy of Natural Sciences of Philadelphia, March 18, 19, and 20, 1937; and from Dr. W. M. Krogman, concerning the meetings of Section H, American Association for the Advancement of Science, in Atlantic City on December 30, 1936.

The Council meeting then adjourned, *sine die*.

The annual meeting of the Society was called to order by President Jenness at the Carlton Hotel, at 9:30 A.M., December 29, 1936. About fifty persons were present.

Dr. Linton presented the following slate contained in the report of the nominating committee:

President: A. V. KIDDER
Vice President: WILLIAM A. RITCHIE
Members of the Council: PAUL S. MARTIN, FRANK M. SETZLER
Fellows: WENDELL C. BENNETT
REGINALD C. FISHER
A. T. HILL
E. B. SAYLES
H. NEWELL WARDLE
GEORGE A. WEST

There being no nominations from the floor, it was moved and seconded that "The nominations be closed, and the secretary be instructed to cast a single ballot for the slate as read." Upon unanimous passage of this motion, President Jenness declared the new officers and Fellows duly elected.

The secretary then read the following motion, which had been unanimously approved by the Council: "Moved that: the By-Laws of the Society be amended so that the first sentence of Section I, Article 8, shall read 'The official year of the Society shall begin on July 1, and the dues shall be payable on that date,' in place of 'The official year of the Society shall begin on January 1, and the dues shall be payable on that date'." The motion was seconded from the floor and passed unanimously.[206]

The secretary then read to the annual meeting the communications from Dr. Howard and Dr. Krogman.

The business meeting of the Society adjourned shortly before 10:00 A.M. and the remainder of the annual meeting was devoted to the following papers:

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[206] This action by the Society makes the fiscal year agree with the volume numbers of AMERICAN ANTIQUITY. Since it had already been ruled by the officers that annual dues should cover whole volumes of the journal, the distribution of the publication is not affected by this action. The Council, in January, 1937, gave its approval to the secretary's suggestion that the dues for 1936 cover the period ending June 30, 1937, and that the officers for 1936 remain in office until the same date, thereby causing the next fiscal year to begin on July 1, 1937.

MORNING SESSION

Godfrey J. Olsen, Certain Archaeological Investigations in the Lake Champlain Valley, including the Orwell (Vermont) Burial Site. (By Title)

Douglas S. Byers, The Excavation of the Nevin Shellheap, Bluehill Falls, Maine. (Lantern)

Frederick Johnson, Problems Surrounding the Classification of Certain Culture Complexes in New England.

William A. Ritchie, The Hopewellian Phase in New York. (Lantern)

Florence M. Hawley, The Present Status of Tree Ring Dating in the Middle West.

Earl H. Bell, The Archaeological Problems of the Lower Niobrara Valley, Northeast Nebraska. (By Title)

E. B. Renaud, Chronology of the Indian Petroglyphs of the Western Plains. (By Title)

John Lambert Cotter, Some Aspects of the Folsom and Yuma Problem. (Lantern)

John P. Gillin, Preliminary Report on Archaeological Investigations in Nine Mile Canyon. (Lantern)

AFTERNOON SESSION

Mary Butler, The Monongahela Woodland Culture.

Isabel Garrard Patterson, Archaeological Survey of the Chattahoochee Valley in Georgia. (Lantern)

Linton Satterthwaite, Jr., Peten Influence on Usumacinta Maya Architecture. (Lantern)

Frank M. Cresson, Jr., Maya and Mexican Sweat Houses. (Lantern)

William Duncan Strong, Historic and Prehistoric Horizons in Honduras. (Lantern)

H. Newell Wardle, A Forgotten Exploration in Chira Valley, Peru. (Lantern)

Ernestine W. Singer, A Fishnet and Some Netted Bags from the Chira Valley, Peru.

Robert McCormick Adams, Significance of the Archaeology of Southeastern Europe.

Respectfully submitted,
CARL E. GUTHE, *Secretary-Treasurer*

REPORT OF THE EDITOR

Your editor invites the critical attention of the members of this Society to late numbers of AMERICAN ANTIQUITY. The Editorial Board has been expending an appreciable amount of effort toward the general improvement of the Society's organ, and it feels that some progress has been made in this direction, largely due to the greatly appreciated coöperation of those members who have contributed matter for publication in the various divisions of the journal, and especially to their prompt response to editorial requests.

The budget has not permitted the quantitative expansion for which we had hoped, but the journal has succeeded in taking care of acceptable submitted matter within reasonable time limits. Although contributions are being received in increased quantity, the journal at no time has been swamped with contributions, and promises to serve adequately as a medium for the timely publication of reasonably short articles.

It has been an editorial policy to foster a strong "Correspondence" division, and the editor is pleased with the manner in which the members of the Society are making use of this division.

Volume I has three hundred and forty pages, twenty-seven plates and ten figures, and Volume II, with Number 3 now in press, promises at least to equal Volume I in size and quantity of illustrative matter. A majority of the illustrations continue to appear through the generous financial coöperation of the authors.

The editor regrets the delay in preparing for publication a Table of Contents for Volume I. This is now ready for press and will be distributed with the Number 4 issue of Volume II. In future, the volume contents will appear at the beginning of each fourth number.

The editor invites criticism of his editorial policies and practices, fully appreciative of the fact that the welfare of the journal depends upon the constructive interests of all whom it proposes to serve.

Respectfully submitted,
W. C. MCKERN, *Editor*

REPORT OF THE SECRETARY

The minutes of the first annual meeting of the Society were printed in AMERICAN ANTIQUITY, Volume I, No. 4 (April, 1936), pp. 310–316. During the past year the organization has grown rapidly, in accordance with expectations. On December 10, there were 574 names on the rolls, distributed as follows: 42 Fellows, 7 Life Affiliates, 482 Affiliates, and 43 Institutional Members.

A sustained membership of this size insures the continuation of AMERICAN ANTIQUITY along present lines, but will not support any expansion of activities on the part of the Society. It should be pointed out that the Committee on State Archaeological Surveys of the National Research Council, which sponsored the creation of this Society, and which has enjoyed financial support from

the Carnegie Corporation for several years, will have no additional funds after July 1, 1937, and may be discontinued. It was expected that the Society for American Archaeology would take over the functions of this Committee at that time. If this objective is to be attained, the membership must be increased in order to insure an adequate income to care for office expenses. The secretary therefore requests the continued assistance of the Fellows and Affiliates in securing additional members.

The activities of the Society during 1936 have consisted of the publication of the journal and the continuation of the membership drive. In September, the President appointed a nominating committee consisting of Emil W. Haury, chairman, Ralph Linton, and J. A. Mason. In October, the Council voted to hold the annual meeting in conjunction with those of the American Anthropological Association and the American Folklore Society in Washington, D. C., during Christmas week. In December, the Council unanimously approved six Fellowship applications, and a proposed amendment to the by-laws changing the fiscal year of the Society.

Respectfully submitted,
CARL E. GUTHE, *Secretary*

REPORT OF THE TREASURER

The present bank balance (December 10, 1936) of the Society stands as follows:

Regular Fund	$534.36
Permanent Life Membership Fund	350.00

REGULAR FUND

Gross Receipts

Balance on hand, December 21, 1935			$ 249.45
Dues:			
1935	$ 291.00		
1936	1359.00		
1937	6.00		1656.00
Sale of Volume I of AMERICAN ANTIQUITY		$153.00	
Sale of extra copies of AMERICAN ANTIQUITY		8.00	
			161.00
Reimbursements			
Reprints of articles	$60.28		
Illustrations	130.43		
			190.71
Gifts to Regular Fund			35.25
			$2292.41

Gross Disbursements

AMERICAN ANTIQUITY		
Printing and Illustrating	$1480.54	
Distribution	32.57	
Reprints	101.02	
		$1614.13
Stationery		30.57
Postage and telegrams		85.96
Bank service charges		21.14
Discounts to subscription agency		6.25
Cash on hand, December 10, 1936		534.36
		$2292.41

Resources

Cash on hand, December 10, 1936	$ 534.36
Due from 1936 dues	342.00
Due from reimbursements (reprints)	42.61
Due from reimbursements (illustrations)	36.95
	$ 955.92

Liabilities

Dues for 1937 already paid	$ 6.00
Bills payable	3.60
AMERICAN ANTIQUITY, Vol. II, No. 3 (in press)	?

PERMANENT FUND

Receipts

Balance, December 21, 1935	$ 200.00
Dues from three Life Affiliates	150.00
	$ 350.00

Disbursements

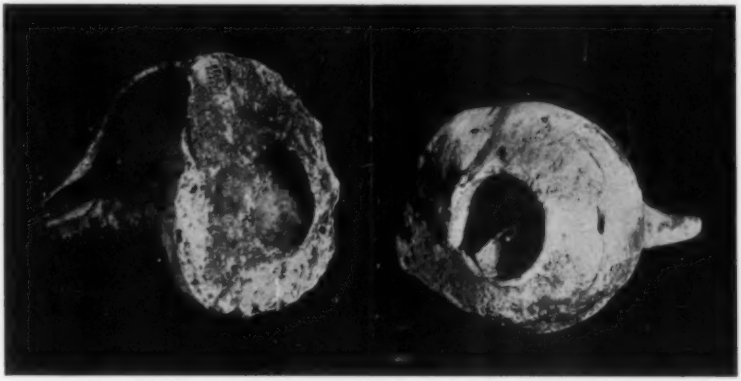
None	$ 000.00
Balance, December 10, 1936	350.00

Respectfully submitted,
CARL E. GUTHE, *Treasurer*

CORRESPONDENCE

Two Probable Shell Trumpets from Ontario

In making investigations pertaining to the question of possible unreported finds in the Mississippi Valley of large conch shells with their spires cut down for the evident purpose of use as a shell trumpet, I wrote the Buffalo Museum of Science. The primary reason was to attempt to trace the actual specimens of *Busycon perversum* shells found at Alton, Illinois, and noted in my article published in this journal, Vol. II, No. 1. Unfortunately, these specimens were not deposited in that institution. However, Mrs. Imogene C. Robertson, Assistant



Curator of Biology and Registrar of the Buffalo Museum of Science, became interested in my attempt. Going over the museum collection, she was able to find two specimens of *Busycon perversum*, as illustrated in the accompanying figure, which has been made available through the courtesy of the Buffalo Museum of Science. Hence, the credit of this find should go entirely to Mrs. Robertson, without whose whole-hearted interest these shells would have remained unnoticed. Possibly others have been found, without any special significance having been attached to this characteristic removal of the spire. As such a modification of these conch shells completely ruins them for any other purpose except blowing through the opening, it would appear to me that such a find, added to the one already reported, should tend to establish the use of shell trumpets in these two areas, possibly before the advent of the whites.

Mrs. Robertson writes as follows: "In looking over our material, however, I find two well-preserved specimens of the same species labeled 'Neuter Cemetery, Humberston, Ont.' These both have the apex of the spire cut off and edges smoothed in exactly similar fashion and may have been used as trumpets."

However, granting that further finds of a similar nature should firmly establish the pre-Columbian use of shell trumpets in parts of the mound-building territory, it seems to me that we will then have solved one question only to raise another more important one. Supposing that the use of such trumpets existed in the period antedating by a reasonably short time the advent of the early New England settlers, then how is it we do not seem to be able to find the slightest reference to such a use in the myths, folklore and legends of the tribes inhabiting this area when discovered? And, if no reference does exist, would it not be reasonable to suppose that when such shell trumpets are found in this mound territory, it might be an indication of a considerable age for a site, or even a different culture?[207]

To my mind, the line of research opened up by this question of shell trumpets in this particular territory offers a most intriguing problem. To attempt to cover it properly necessitates the coöperation of the many readers of AMERICAN ANTIQUITY, particularly those specializing in the archaeology of this large area. Their specialized knowledge, now that the matter has been called to their attention, should lead to the ultimate solution of the question.

What is first required is an examination of those conch shells stored in institutions, such as Mrs. Robertson was so prompt in undertaking. By plotting such finds on our maps we would soon be able to note graphically which groups of mounds had such trumpets, and coördinate this data with the finds of other worked marine shells, such as *Busycon perversum* containers, Olivella and Marginella beads, *Oliva sayana* pendants, and so forth. With such information as a basis, it should be possible to establish tentative trade routes, separate the various cultures, and possibly, in time, lay the foundation for the beginning of a chronological outline. Specimens of marine shells from each section would, perhaps, permit me, by a study of their relative degree of disintegration, to work out such a tentative chart.

Will our readers now assist in this project? From the spontaneous spirit of coöperation shown in the archeo- and ethno-conchology research, I believe that they will do so.

HENRY J. BOEKELMAN
Louisiana State Museum
New Orleans, Louisiana

CULTURE IDENTITY OF THE OZARK "TOP LAYER"

In Volume 26, No. 1, pp. 1–21, of the American Anthropologist, n.s., Mr. M. R. Harrington briefly described the salient features of the remains found in

[207] A. L. Kroeber has already shown us how it would appear that at Chincha, Peru, one culture (the earlier) apparently ignored, or paid but slight attention to the *Spondylus princeps*, whereas the following one (the Inca) quite evidently held this shell in the highest religious esteem, the latter confirmed historically by Spanish chroniclers at the period of the conquest of Peru. Other similar examples from various parts of the world can be found in my files.

the Ozark region of northwestern Arkansas and southwestern Missouri. Two separate archaeological cultures are distinguished. Harrington called the earliest remains the Ozark Bluff-Dwellers culture, and the group of traits that was occasionally found on top of some of the sites he called the "Top-Layer" culture. Upon the conclusion of the excavations in the Ozark region Mr. Harrington visited an Iowa Indian settlement in northeastern Kansas where he came into contact with a non-professional archaeologist, Mr. Edward Park. Upon examination of Mr. Park's collection Harrington noticed that the remains of a culture said to be the latest in that region, "was characterized by a series of objects identical with those the writer (Harrington) had found to be typical of the 'top-layer culture' in the Ozark rockshelters."

The possibility that the latest culture, as identified by Park, might be Kansa remains, and the "Top-Layer" Osage, is set forth in the Anthropologist article. W. D. Strong in his *Introduction to Nebraska Archaeology*, on page 284 refers to Harrington's paper and mentions that the Nebraska culture is also found in northeast Kansas. There is a possibility, says Strong, that the "latest culture" of Park may be a development out of the Nebraska culture, and also that it might be Oneota. The list of traits given by Harrington for the "Top-Layer" is as follows: small, often triangular flint arrowpoints; double-pointed, sharply beveled knives; duck-bill or spoon-shape scrapers; the celt; flat, circular hammer-grinders; mortars with a cup-shape cavity; small L-shape catlinite pipes; grooved sandstone shaft smoothers; bone fishhooks; corn; shell-tempered pottery of globular form, flaring rim, angular incised decoration, and flat, strap-like handles. This complex of traits certainly identifies the "Top-Layer" as a division of the Mississippi Pattern. Unfortunately, Harrington was unable to illustrate these finds in this short report.

The latest work by Hill and Wedel, Vol. XVII, No. 1, Nebraska History Magazine, identifies the "latest culture" of Park with the Oneota of Iowa. Therefore, on the basis of the list of traits given by Harrington and his statement regarding its resemblance to the "latest culture" in northeastern Kansas, I should like to point out the probability that Harrington's "Top-Layer" will eventually be classified in the Oneota aspect of the Upper Mississippi phase.

JAMES B. GRIFFIN
Ceramic Repository
University of Michigan
Ann Arbor, Michigan

REVERSED STRATIGRAPHY

In a recent publication, George C. Vaillant states: "Archaeological dating, in the absence of specific written testimony, depends on stratigraphy, the study of sequence in the ground of layers of human culture. Especially favorable for such research are rubbish heaps, since the objects at the base of an

undisturbed midden must be older than those at the top, which were obviously the most recently deposited."[208]

Dr. Vaillant's faith in the chronological sequences embodied in undisturbed refuse mounds may never be betrayed, for ancient Mexicans may never have had the annoying tendency of some ancient Southwesterners to move the material of old dumps, redeposit it on top of their contemporaneous refuse, cover it with the growing accretion of daily refuse, and then perhaps move more old refuse on top. Such a dump, when tested by the archaeologist, certainly has not been disturbed since it was laid down in the present sequences, but "the objects at the base" of this "undisturbed midden" are not all "older than those at the top," although they were obviously the most recently deposited. Kidder encountered this situation at Pecos, and between 1928 and 1934 I found myself faced with the problem of determining the inversion of strata in the large east dump of Chetro Ketl, Chaco Canyon, New Mexico, and then of working out the pottery sequence from its inverted stratigraphy.[209]

In this case, strata 1 and 3, counting up from the bottom, and strata 2 and 4 looked alike, but 1 and 3 differed slightly from 2 and 4 in showing lenses of ash and charcoal, while the other two showed the material more mixed and lumpy. This suggested that the lense-marked strata were of daily dump, while the other was re-dumped material cleared from some old kiva or room later built up and put into use again. The suggestion looked far fetched, however, for this would place half the mound as re-dumped material. Other evidence was necessary.

Fortunately we were accustomed to tree ring work in this area, and although small chunks of charcoal occurring in a dump had never before been tried out for dates, we had saved them from our strata tests. They were preponderantly piñon, with an appreciable percentage of pine. A piñon master chart was drawn up from the usable fragments, averaging about an inch from exterior to interior rings. This chart was fitted onto the known pine master chart for the area, and the fragments were thus dated. In a number of cases the charred bark still adhered to the wood. The dates checked the supposition of inversion and at the same time closely dated the associated pottery, for the potsherds and the charcoal from the house fires had been thrown out together. With the exception of the small amount of daily refuse being thrown out while the huge amounts of old trash were being moved, the material at the bottom of this section of the dump and in the third stratum, about two feet above and two to three feet thick, was later in origin than anything else in this mound, which measured twenty feet in height.

Hence, unhappily, we can scarcely say that it is obvious that "the objects

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[208] Vaillant, George C., The History of the Valley of Mexico, Natural History, p. 325, Nov., 1936.

[209] Hawley, 1934.

at the base of an undisturbed midden must be older than those at the top." In every ointment there is some fly.

FLORENCE M. HAWLEY
University of New Mexico
Albuquerque, New Mexico

CREDIT TO PROFESSOR MOOREHEAD

Through an oversight no reference was made, in a paper on the "*The Simple Bone Point*" of the Shell-Heaps of the Northeastern Algonkian Area—(This series Vol. I, No. 4, 1936), to the contributions of Professor Warren K. Moorehead on the subject. In view of the extent of his archaeological explorations in Maine this was most unfortunate and the author hastens to apologize. It may be pointed out, however, that in the above paper, as the title indicates, no attempt is made to deal with the general subject of the archaeology of Maine, but the subject matter is for the most part restricted to the consideration of a single type of object.

The description of bone points of the type under discussion furnished in Professor Moorehead's report: *Archaeology of Maine*, Andover Press, 1922, is, to say the least, meagre. Under the title "Long Bones," there are about eight sentences having direct reference to these points in which the only descriptive terms employed are "small, pointed, polished objects." The brief discussion deals otherwise almost wholly with hypothesis. An excellent photographic plate bearing the legend: "Fig. 100. Typical arrow-points and fish hooks of which several thousand have been found,—From shell heaps. S. 1-1." serves nevertheless definitely to identify them. The selection of specimens of sharp-pointed, complete bone points for this illustration has failed not only to bring out a very characteristic feature, namely, the almost constantly occurring fracture and chipping, of a type that could be accomplished only by violent terminal impact, but also other characteristics such as the extent of the surface polished, bipolar and bilateral asymmetry, are not adequately shown, and orientation is neglected.

Professor Moorehead's recently expressed views in regard to the significance of the bone points in question (This series, Vol. II, No. 2, 1936) appear to lack factual support. The important and regularly occurring characteristic of dulling through successive terminal impacts is again omitted from his discussion. While we see no reason why sharpened bone points should not have been employed on the coast of Maine for fishhooks and gorges, this possibility furnishes no basis for the assumption that bone objects of a special type regularly showing fracture by terminal impact were so used. The polishing and continued use in many instances of dull and fractured points of this type, without sharpening, seems incompatible with the fishhook hypothesis. The possible usage of the simple bone point for purposes for which it was not intended

is, of course, not denied. We have the familiar examples of the employment of stone projectile points for drills, reamers and scrapers.

The quite obvious advantages of the large or "broad-head" type of arrow point for killing large game are likewise not disputed. In fact, stone points which might serve this purpose are quite common in Maine shell-heaps and the iron "trade" points found in these sites are notably large for arrow points. On the other hand, in view of the prevalence in New England of very minute stone points, and others made as long and narrow as it was possible to make them of such material, it seems clear that points not especially well adapted for killing large game, were widely employed. I have no information as to the incidence of very small stone points in the Maine shell-heaps beyond the fact that small narrow forms have been found that would make no greater wounds than a moderate-sized bone point. Further than expressing reasons for concluding that they were projectile points, I am not aware that I have implied any specialized usage of the simple bone points.

The apparent absence of these objects in sites away from the coast in contrast with their frequency in shell-heaps, may be accounted for by the perishable nature of bone except under certain conditions, as for example those furnished in shell deposits. If numbers of bone artifacts of other types were to be found in interior sites, only then would the absence of the simple bone point be significant. It is quite possible that some future discovery may throw new light on the subject and show that simple bone points were employed for quite another purpose than for projectile points, but with the information at hand the latter hypothesis appears to furnish the most probable explanation.

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SOUTHWESTERN TRADE IN SHELL PRODUCTS

In the article: *A Shell Bracelet Manufactory*, by Arthur Woodward, which appeared in the October, 1936, issue of this journal (Vol. II, No. 2, pp. 117–125), Mr. Woodward states that the origin of Glycimeris shell artifacts found over the Southwest "has not been established." Although Dr. Sauer and I did not explicitly mention (in our report of 1931) the Boquillas and other west Sonoran sites as presumptive shell gorget and bracelet manufacturing centers, and as sources for trade to the north and east, this was implicit in the printed discussion, and was certainly in our minds at the time of discovery. Furthermore, concrete expression was given to these propositions in my article: *Prehistoric Trade in the Southwest*.[219] The following quotations from this article contain the pertinent material:

"Sea shells are the best markers of long prehistoric trade routes in the South-

[219] New Mexico Business Review, Vol. 4, No. 4, pp. 202–209, Oct., 1935.

west. This is because large numbers were used, and they have been found in almost continuous distribution from unmistakable points of origin on the coasts of the Californias, Sonora, Texas, and Tamaulipas to hundreds of localities in the interior Southwest. Although the Indians of the Southwest did not use sea shells as money (as did Old World peoples with the cowry, Northwest Indians with dentalium, and Atlantic Coast Indians with peak or wampum of clams, etc.), nevertheless sea shells were and are highly prized as personal ornaments. Distance from sources was a selective factor in the kinds of shells found most commonly at various Southwestern sites, and also found expression in a zonal arrangement of absolute quantity. Haliotis (abalone) shells, obtained only from the Pacific Coast, are found more commonly in California and Arizona than in New Mexico and Chihuahua. Glycimeris, Conus, and Olivella shells decrease in quantity from Sonora and Chihuahua sites (where they are very abundant), through southern Arizona and New Mexico (where they are fairly common), to sites in northern Arizona and New Mexico, and in Utah and Colorado (where all species of sea shells are rather uncommon). According to conchological determination of species of sea shells represented in Southwestern sites, probably all Haliotis shells came from the Pacific coast of California; the Glycimeris (Pectunculus) shells originated in the Gulf of California; Olivella and Conus shells, according to species, came from either the Pacific or Atlantic. In addition to the above mentioned species of sea shells, various Pectens, Strombus, Turritella, and Nassa are found in Southwestern sites in varying numbers which normally reflect distance from the source. The Indian trader was evidently conservative of his energy, for practically never have the 'blanks,' or portions of shells rejected in elaboration, been discovered in sites in Arizona, New Mexico, and Chihuahua. That this feature, which has puzzled numerous archaeologists, represents rough elaboration of the shell near the sea coast was determined by Professor Sauer, of the University of California, and the writer through the discovery of several sites near the Gulf of California Coast of Sonora which contained thousands of 'blanks'—mainly of Glycimeris." (pp. 203–204.)

"Trade routes can be plotted fairly accurately on a large scale map, through following the distribution of such 'trail markers' as a continuous but diminishing number of Middle Gila Polychrome potsherds from the Upper Gila near Virden, up the Animas drainage line, across the San Luis Basin into Chihuahua, down the Nogales and Huerigos drainages to the Carretas, down the Carretas and across the Ramos plains to the Casas Grandes, and thence diffused over the northwestern Chihuahua culture area. Similarly, trade routes for peoples of the Mimbres, Little Colorado, El Paso Polychrome, Chupadero, and other cultures can be traced through the distribution of typical potsherds. The marked association of turquoise with Mimbres wares, and later with Middle Gila wares, in southern New Mexico and northern Chihuahua indicates that turquoise from the Burro Mountains was first a Mimbres monopoly which was later taken over by the Middle Gila Polychrome people. This assumption

is strengthened by the finding of Middle Gila Polychrome pottery in horizons above Mimbres material at sites in and near the Burro Mountains. The trade in Gulf of California sea shells, however, is not marked by potsherds of Sonora cultures advancing into Chihuahua and New Mexico, but by the distribution of Casas Grandes Polychrome ware nearly to the Gulf. Either Chihauhuans carried ceramic wares to such shell-ornament 'factories' as Boquillas near Las Trincheras to exchange for Glycimeris, etc., or Sonorans packed the shells to Chihuahua culture communities in the Bavispe drainage where they obtained the beautiful Casas Grandes vessels. There was no trade in Sonoran ceramics, as these were greatly inferior on all counts to Chihuahua wares." (p. 208.)

I fail completely to understand Mr. Woodward's belief that his interpretation (pp. 119–120) of the village deposit at the Boquillas or La Playa site differs from that presented by Dr. Sauer and myself. If he will re-read the relevant paragraphs (pp. 117–118 of the quotation; pp. 93–94 of the original) he will note that only the riprap on the tops of the occasional three-foot mounds is considered as resting *in situ*, and that the bulk of stone and artifact material is held to have been redeposited through the denudation and reduction of the general area by sheet floods. Especially note the statement, "We concluded therefore that the mounds, mostly elongated in the axis of the valley are the result of sheet flood erosion, that the entire surface since its habitation has been lowered about three feet by sluicing, with the exception of certain small surfaces protected by a riprap of rock." It should be added that there probably occurred a period of deposition over the entire site, after it had been abandoned, before erosion and denudation began their work.

Apropos of Mr. Woodward's statement, in the second whole paragraph of page 120, there was no confusion in the identification of the small manos. The stones so identified carried definite evidence of use as grinding tools, with no surfaces indicating a percussion use.

I should like to bring up one more point for consideration by all Southwestern archaeologists. Just how numerous actually are the legged vessels from the Gila valley, and elsewhere in the Southwest, which have been cited so often as evidence for Central Mexican influence? I am referring to vessels which have been purposely legged as a support mechanism (Mexican type), and not to those where the legs are pertinent to the representation of some animal. So far as I have been able to find, the examples cited by Vaillant (1932) from Fewkes (1912), Gladwin (1930), and Woodward (1931), cover the field of published and illustrated finds. One would gather from the literature, and an examination of museum material, that legged wares are exceedingly rare in the Southwest, and are predominantly undecorated. The writer would appreciate very much the citation of authentic prehistoric legged vessels from the Southwest, if any additional examples are known.

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Probable Uses of Flint End-Scrapers[211]

The letter by Mr. Irwin W. Cox concerning "Indian spoons" brings back memories of past years. When a youth in northeast Missouri, I never found a stone scraper; but in 1901 while examining an Indian camp site on the Missouri River in Saline County, the landowner gave me some small scrapers and asked if they were not Indian spoons. Mr. Cox's reference marks the first time since then that I have heard of that term being used. At that time people generally knew little about most types of stone artifacts. Previously I had neither seen nor heard of anything like them, but after experimenting, I decided that they must be scraping or planing tools. It was a number of years afterward before I saw similar scrapers illustrated and described in some European texts on Paleolithic man.

In central west Texas, spoon-shaped flint scrapers are found in great numbers in a majority of the surface, and near surface camp sites. My collection contains several thousand specimens. From one site more than five hundred scrapers of that type were collected. While there is a general similarity in form, there are a great many subforms, differing greatly in details of size, thickness and shape, and in the flaking technique used.

It is evident that the tribal groups which occupied certain Texas sites made one type, whereas the former occupants of nearby sites made quite different types of scrapers. While all are now surface sites, there may have been a time interval between them.

There is little doubt that the latest purely stone-age occupation of Texas was the period of the greatest use of this type of scraper, and also that as one goes down in stratified deposits, few are found much below plow depth. Some are found several feet below these shallow deposits, but generally the deeply buried scraping tools do not have the rounded keel-backed spoon-shaped form. Instead, the evidence shows a steady progression through many variant forms of side scraping tools. The nearest to this type are the large square-ended or straight cutting-edged "Clear Fork Complex" scrapers which erode from the same old surfaces where true Folsom points are found.

In one surface site many small, beautifully made oval scrapers, similar to the illustrations of those found at the Lindenmeier site with Folsom points by Roberts, have been found with generalized Folsom points. Many of these scrapers have keen points opposite the cutting ends. However this small type is not the prevailing size in this region. Out of nearly 3000 spoon-shaped scrapers found near Abilene, less than 400 were of the smaller type, and these were collected from a few sites where large scrapers were not found. All of the others were of a type which usually varies from 1 7/8 inches to 2 1/8 inches wide at the cutting end, and from 2 3/4 to 3 ¼ inches in length. While a few

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[211] This article was submitted previous to the publication of Mr. Over's article on the same subject in this journal, Vol. II, No. 3, pp. 208–209.

are considerably larger, and some smaller, most of the scrapers are rather uniformly within the above measurements. Even the small scraper type found here averages larger than the common northern type described by Mr. Cox.

It may have been possible to have used the small scrapers to remove marrow from bones, but this must have been one of the minor local uses. The arguments would not apply here since nearly all are too large for such use. Various observations have convinced me that the spoon-shaped scraper was the Indian's common pattern for a pocketknife, and was used for most of the purposes that a boy's jackknife is.

Several years ago a farm boy who was interested in my collecting asked me what scrapers were used for. My reply was that they were Indian pocketknives and probably were used to skin animals and to clean hides. The boy was then trapping small animals for furs, and later told me with enthusiasm that he had found the small flint end-scraper to be a very much more efficient tool with which to skin a fur-bearing animal than his pocketknife, and that there was no damage to the hide when it was used, whereas accidental damage somer times occurred when he used a pocketknife. He informed me that thereafte he always carried a flint scraper in preference to a knife for that purpose.

In the Cox letter the following statement occurs: "For hide work there would be no object in having the heavy blunt edge so carefully rounded and chipped, nor the front side smooth." On the contrary, I think that no matter how tight a hide was stretched, it would stretch somewhat to scraping pressure, and that an ordinary knife of either a straight or bevelled edge would have a tendency to bite into the hide at the ends, if not elsewhere, and damage it, whereas the thick rounded end of the end-scraper would slide over it without biting into it, while the down and inturned cutting edge would be admirably suited to clean the surface. One can grasp a scraper between the right thumb and forefinger and draw it downward across the palm of the left hand to get the idea.

If one wants to risk cutting his hand, he can get an ordinary thin-edged flint knife or a flake knife and apply equal hard pressure, thus determining which is the most efficient scraping tool. In a flint knife the point at one end, the corner at the base and the straight edge would all be liabilities in either skinning or fleshing a hide.

In 1928, I was directed to some "old Spanish Mines" situated on top of a high, dry hill a considerable distance from water. Much to my surprise, the whole hill top was strewn with keel-backed flint end-scrapers. Over a hundred were found on the first visit, and these were lying on top of grassy sod which never had been plowed. Along the brow of the hill for a half mile were a series of deep, wide pits, where prehistoric Indians had excavated limestone slabs containing a vein of red oxide of iron or rouge. These slabs had been carried to a flat space on the hilltop to remove the red paint. Evidently the paint had been scraped off in a fine red powder with flint scrapers, since as many as three or four scrapers lay close beside and around some of the slabs, and

scattered thickly all between them. There were no hearth rings, bones, shells, hammerstones, manos and metates, or other camp site debris, and relatively few arrowheads and knife blades.

A few small slabs had been carried to the two camp sites on the creek bank situated one and two miles away, but evidently most of the paint had been scraped from the slabs on the hill where it was mined. I picked up some of the flint scrapers, lying around the slabs, and easily scraped the red paint off in a fine powder which could be applied as dry paint. In May, 1929, Dr. Walter Hough of the U. S. National Museum was taken to the site, and this was demonstrated to him. He agreed that it undoubtedly was the explanation of the number of scrapers being found at the paint mine site. He was greatly interested in my demonstration of that use of flint scrapers, and advised me to get it into print at the earliest date, since he never before had heard of that use of scrapers. This was done in Vol. 1, September, 1929, Bulletin of Texas Archeological and Paleontological Society, pp. 17–18.

Another probable use of flint scrapers was in making bows and arrows, and scraping and polishing a variety of other wooden artifacts. I have no direct evidence of this, but when a very small child in Missouri during the eighties, I watched the country boys make excellent bows and arrows of hard, supple hickory wood, for use in rabbit hunting. After roughing these down with pocket-knives, they carefully scraped and polished them smooth with broken peices of thick bottle glass. The arrows were made with round wooden points hardened by scorching on the hearth.

It is probable that this technique was a survival of that acquired from Indians by some previous generation of boys, and that the use of glass, as the scraper of wood, came from the similar use of its prehistoric flint-scraper prototype.

Perhaps flint scrapers were also used to work bone and shell ornaments. Those provided with gravers opposite the cutting ends could have been used to incise wood, bone, shell, stone and pottery, and probably were also used in tattooing, as Roberts has suggested in his 1936 Lindenmeier site report.

The statement of Mr. Cox that the sites where scrapers are found are always full of bones is also true for Texas. When we consider that the cutting ends of the Texas scrapers usually are too large to have been used to extract marrow from bones, his theory of such usage requires proof. The same abundance of buffalo bones and teeth in the sites where scrapers are found might indicate that here hunters had killed more animals, and a greater need existed for both skinning and fleshing tools. A certain proportion of scrapers are equipped with thin cutting edges at the ends opposite the thick scraping and fleshing ends. These would be as suitable for cutting the hides open, as the other ends would be for peeling them off.

These must have been the little flint tools mentioned by the early Spanish explorers of this region as used by the Indians in skinning bison, although the explorers failed to describe the type of implements used, and some assume them

to have been the usual flint knife blades. The large scrapers found in the former bison country may have been used to skin the larger animals and the small scrapers on small fur-bearing animals.

Certain experiments of mine prove that end-scrapers were not made by pressure flaking, but by percussion. A perfect pear-shaped flint scraper can be made in about a minute's time, but that is another story.

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NOTES AND NEWS

Arctic Area

During the past summer Dr. Froelich Rainey of the University of Alaska conducted an archaeological survey of the Upper Copper River, the Tanana part of the Yukon between Tanana and Circle, and the Chandalar up to Chandalar Village. A number of old sites were discovered on the upper Tanana and on the Copper, and a pottery producing site was found on the Yukon six miles below Rampart Rapids, 35 miles above Tanana. It is significant that the old sites were located for the most part on the smaller clear-water streams and lakes, and not on the larger rivers. Flint tools found at several sites in the Tanana valley resembled in part those found at the University campus site. (*H.B.C.*)

Archaeological investigations at Bering Strait and along the Arctic coast of Alaska were carried on by a joint expedition of the National Geographic Society and the Smithsonian Insititution, under the direction of Henry B. Collins, Jr., assisted by James A. Ford and Harrison Prindle. The objectives were twofold: (1) further studies of prehistoric Eskimo culture, in continuation of those of previous years on St. Lawrence Island and at Pt. Barrow; (2) an intensive search for pre-Eskimo remains in the vicinity of Bering Strait. The results as regards the latter objective were entirely negative; a careful search along the Alaskan side of Bering Strait and on Little Diomede Island revealed no trace of pre-Eskimo or non-Eskimo remains. While there is every reason to believe that Bering Strait was the original gateway through which man entered America, it is now evident that any cultural remains dating from that remote period, if present at Bering Strait, are completely covered over.

The excavations of old kitchen-middens, however, produced valuable evidence bearing on Eskimo chronology. Most of the work centered at Cape Prince of Wales, the scene of Diamond Jenness' pioneer excavations in 1926. The abandoned mound site just back of the present Eskimo village yielded material and information of considerable importance, since it is an actual Thule site. The exact status of the Thule culture in Alaska had been somewhat obscure, since the sites showing the closest resemblance to the Thule culture of the Central region were those dating from protohistoric or modern times, and, according to every indication, strongly affected by a return or westward movement of Thule culture within the past few centuries, subsequent to the original eastward movement from Alaska. On the other hand, the older Alaskan sites, such as those found on St. Lawrence Island and Pt. Barrow, were demonstrably older than the Thule culture of the east and Central regions. The old mound site at Wales, however, represents an intermediate stage which shows no evidence of the late features introduced by the backwash of Thule culture, but is later than the Old Bering Sea and Birnirk, the basic prehistoric culture stages of northwestern Alaska. The postulated Birnirk to Thule sequence of

harpoon heads received confirmation when stratigraphic excavations at the mound site revealed evidence of the actual transition. The expedition also discovered and excavated a small site of late Birnirk culture, the first pure Birnirk site thus far known outside of the Barrow region.

Coincident with the work at Wales was the further investigation by Mr. Ford of old sites near Wainwright and Pt. Barrow, where he had worked in 1931–32. Valuable evidence was obtained confirming previous determinations that the cultural sequence in this region was Old Bering Sea to Birnirk. (*H.B.C.*)

Southwestern Area

Four parties went into the field from the University of New Mexico during the summer of 1936. Under the leadership of Dr. Donald D. Brand, with the assistance of Wesley Bliss (University of New Mexico) and Virgil Peterson (Brigham Young University), a party of twenty (representing eleven institutions) devoted six weeks in June and July to an archaeologic and geographic reconnaissance of the state of Chihuahua, Mexico. The Mennonite and Mormon colonies were visited; some Tarahumara Indians were encountered; and a detailed survey was made of the cliff ruins in the Garbato-Chico region of the Papigochic drainage. During the last days of June and the beginning of July, the Director and two others made a brief study of the Zape ruin area in northern Durango. After this, the last three weeks were devoted to excavating (under permit from the Mexican government) for stratigraphic evidence in two ruins within the Casas Grandes drainage—on the Agua Zarca near Ojitos, and at La Morita on the Carretas river.

The 1936 session of Middle American studies consisted of an archaeological and ethnological reconnaissance in southern Mexico, under the leadership of Dr. Edgar L. Hewett. The trip was made by automobile, the party driving down the new highway from Laredo to Mexico City. Special emphasis was placed upon the study of the remains and people of the Valley of Mexico, with extended field trips as far south as Monte Alban and Mitla. Other centers studied were Cuernavaca, Tasco, Toluca, and Lake Patzcuaro. A large collection of Mexican archaeological material was made by the party and brought back to be added to the Museum of Anthropology at the University of New Mexico.

An advanced research session, under Dr. Reginald Fisher, with assistance from Dr. Malcolm Bissell of the University of Southern California, operated in the Chaco Canyon during the summer—chiefly in June and July. Navajo ethnobotany, Navajo linguistics, and Navajo archaeology were studied, in addition to the normal excavation work at sites in the canyon.

In view of the limited knowledge of the small mounds of Chaco Canyon, it was decided that the 1936 General Field Session of the Department of Anthropology of the University of New Mexico should concentrate its excavations upon a mound which could be uncovered, studied, and reported upon in one

season. The Field Session students, forty-seven in number, and representing twenty institutions, enthusiastically uncovered a ruin of P II, superimposed upon a ruin of P I and traces of pit houses representing BM III. This superposition provided data for a sequence of Chaco walls antedating those of the large ruins and going back to BM III. In the rooms were numerous burials, rare in later Chaco ruins, accompanied by abundant grave offerings of pottery, mats, and stone and wood artifacts. Notable among the articles of wood was a plaque cut into the shape of the profile of a head, painted turquoise green, and marked with a front view of a black and white eye and a black line of hair.

Stratigraphic excavation of the dump indicated the pottery complexes typical of each period. Deposition in the canyon was studied through a twenty-five foot trench cut from the surface down eighteen feet to sand showing no evidence of culture material. Geologic examination of the lenses and layers uncovered resulted in establishing a sequence of wet and dry periods which were dated by incorporated sherds of types previously given dates through association with tree-ring specimens in the Chetro Ketl dump.

Apart from excavation and laboratory work on specimens, the students were enrolled in classes providing University credit and offered by an outstanding group of anthropologists: Dr. Julio Tello of the University of San Marcos, Lima, Peru; Dr. Ernst Antevs of the University of Stockholm; Dr. J. Eric Thompson of the Carnegie Institution, Washington; Dr. Leslie Spier of Yale University; Dr. E. L. Hewett of the School of American Research; and Dean G. P. Hammond, Dr. D. D. Brand and Dr. Florence Hawley of the University of New Mexico. Excavation and laboratory work were under the direction of Frank Hibben, Wesley Bliss, Donovan Senter, and Florence Hawley of the University of New Mexico. Dr. H. G. Alexander of the University of New Mexico carried on studies in Navajo linguistics and philosophy. The camp was directed by Dr. Brand.

An illustrated report of the excavation of this site and on the resultant study will be published by the University of New Mexico this spring.

Throughout the year 1936, excavations have been carried on in a cave, in the Sandia mountains, which contains seeming evidence for the association of man and several extinct animals of the Pleistocene or post-Pleistocene. This work is being continued by the University under the direction of Wesley Bliss. Much of the earlier work had been directed by Frank Hibben. (*Donald D. Brand.*)

Plains Area

Archeological fieldwork in the Central Plains, conducted by the Nebraska Historical Society, was brought to a close late in December by the approach of snow and cold weather. However, a number of week-end excursions have been made by Mr. Hill to investigate a village and burial site near the mouth of Salt Creek. This work was stimulated by the circumstance that Le Sueur (1701), Bourgmont (1717), and Delisle (1718), as well as several other early

18th-century Frenchmen, recorded the existence of an Oto village or villages in what appears to be this locality. Bourgmont, indeed, stated that ten leagues up the Platte River was an Oto Indian village on the bank of a little river from which they made salt. So far no house sites have been excavated, but it is believe that at least one has been located. Sherds found on the surface of the site, and also in several cache pits, are closely similar to Oneota pottery from the Leary site. The same test pit which revealed indications of a probable house site also netted several Oneota sherds. A number of ossuaries have been opened on the bluffs near the village site but have yielded no artifacts other than a very few cord-marked potsherds. A very little metal and two glass beads have come from the site. On the basis of these discoveries, it seems quite possible that the Oneota culture in eastern Nebraska may be definitely identified, at least in part, with an early historic manifestation of the Oto tribe. A few Oneota-like sherds were found recently by Hill and Champe at the mouth of Independence Creek, Doniphan County, Kansas, where Bourgmont visited a large Kansa village in 1724.

Preoccupation with eastern Nebraska, and the arrival of inclement weather, prevented a projected visit by Mr. Hill to the Stinking Water Valley in southwestern Nebraska. From one site in that locality have come several fragmentary tubular pottery pipes with incised decoration, similar in style to the clay pipe found by Martin at the Scott County, Kansas, pueblo ruin. These pipes, along with certain other finds in that region, appear to indicate definite contact with puebloan peoples, but under what circumstances is not yet clear. Present evidence points toward a relatively late and presumably post-contact date for all puebloan traces so far recorded in the Central Plains. Associated with the clay pipes on the Stinking Water were others, tubular and disk-platform, made of steatite; but it is not known with what ceramic complex these occurred.

From Washington County, Kansas, Mr. Hill has obtained cord-impressed sherds of general Upper Republican type but differing from the latter in the use of curvilinear and rectilinear incised decoration applied after use of the cord-wrapped paddle. In this respect the sherds are unlike anything yet reported from southwestern Nebraska but are identical to specimens found in a prehistoric village and burial site about four miles east of Salina, Kansas, on the Smoky Hill River. At Salina, where square earthlodges occur, certain inclusive but aberrant potsherds and effigy-pipe fragments recall wares produced on the Red River in southern Arkansas and Oklahoma. Dellinger, who has seen these specimens, concurs in the view that they are probably of southern manufacture and that their occurrence in the Smoky Hill Valley doubtless represents trade contacts. The great bulk of the pottery at Salina, it should be noted, is closely related to the typical Upper Republican ware of southern Nebraska. There is indication of two distinct cranial types in the burial ground.

In northeastern Kansas there are unmistakable traces of Woodland, Oneota,

Upper Republican, and Nebraska culture remains, as well as suggestions of Hopewellian-like materials. Many other sites remain as yet unidentified.

Mr. Paul Cooper was appointed archeologist by the Nebraska Historical Society last December, taking over the position which Waldo R. Wedel held prior to joining the National Museum staff. (*W.R.W.*)

C. B. Schultz reports that in the course of recent paleontological investigations near Crawford, in northwestern Nebraska, he found sites yielding Woodland pottery. He states further that in some instances the Woodland horizon is overlaid by a second pottery bearing level, the two being separated by sterile non-cultural material. This carries the distribution of Woodland pottery types in northern Nebraska west to Wyoming; it has already been found in southern Nebraska near the Colorado state line. No excavations have as yet been carried out on these particular sites. (*W.R.W.*)

Northern Mississippi Area

On January 1, 1937, Mr. G. K. Neumann began a three year study of Ohio Valley skeletal material under the auspices of the Museum of Anthropology of the University of Michigan. Mr. Neumann will work primarily on the skeletal remains attributed to the Fort Ancient aspect of the Upper Mississippi phase. It is hoped that this study will be but the first of a series which will serve to identify the physical type of various archaeological cultures and the eastern United States. Any theories of the movement of cultural traits by migration of peoples from one area to another, should be checked by a study of the physical type found in the different areas. (*J. B. G.*)

Dr. Florence Hawley will join the staff of the Department of Anthropology, University of Chicago, for a three-year period. During this time she will continue her studies in the dendrochronology of the Mississippi Valley. This research is made possible by a gift through the Indiana Historical Society. (*T.D.*)

A limited number of copies of a report on the *Archaeology of Missouri, Part I, Pottery*, W. B. Potter, Archaeological Section, St. Louis Academy of Science, pp. 1–30, 5 maps, 23 plates, Salem, Mass., 1880, has recently been found by the St. Louis Academy of Science. It is the opinion of the present officers of the Academy that these reports were printed but never distributed, since local libraries are without copies. While they last, these are for sale at $2.00. (*P. F. Titterington.*)

Northeastern Area

During last summer and fall important excavations were carried on in eastern Long Island on sites of the recently discovered and still to be described Orient focus of the Vine Valley aspect in New York. Mr. Charles F. Goddard,

President of the Long Island Chapter of the New York State Archeological Association, describes the discoveries as follows:

"Announcement was made in the issue of July, 1936, p. 53, of a new culture manifestation developing in an excavation by Mr. Roy Latham, Long Island Chapter, New York State Archeological Association, at a site on two closely adjacent hill tops at Orient, Long Island. At that time the excavation of the cremation pits on the east hill had but just begun. In addition to the traits already recorded, several significant characteristics should be noted: the presence of large massed deposits or red ochre (powdered hematite); groups of 6- to 12-inch boulders in close association with some of the caches; clusters of small pebbles; and an artifact of light sandstone, barrel shaped and drilled through endwise (unique on the site). On each of two opposite sides of this artifact is a slightly protruding ridge suggestive of an incipient wing, and on one somewhat flattened side is a longitudinal groove or depression. The sectional contour is ovate and the specimen conforms precisely to Fig. 42. page 65, of Willoughby's *Antiquities of the New England Indians.*

"Early last summer Mr. Charles F. Goddard of the same Chapter, with Mr. Latham, located another station of the same culture on a hill top at Shinnecock Hills, on the South Fork of eastern Long Island. Permission to explore was generously granted by the owner, Mr. Grosvenor Atterbury, and that site has now been worked out. The important features were cremation pits, with the deposits at the general depth of 5 to 7 feet, depending on irregularities of the underlying white sand, Large masses of red ochre were surrounded by black ash beds filled with bits of calcined bone, and many ceremonial caches. With one exception, to be noted below, the traits and types here correspond precisely to those at Orient, and need not be re-enumerated. The rude celts and adzes were notably rough, with no polish except at the well-made bits. As at Orient, the sherds of the steatite vessels, though sometimes deposited together in cache, were much scattered about. The parts of one vessel were found all over the site, indicating the contemporaneity of the pits. At Orient rotted steatite was rare. Here at Shinnecock, while numerous restorable vessels were recovered, there were large quantities of sherds too far rotted for successful recovery. This was particularly true of two large heaps in cache, among which, however, were the sherds of several now restored vessels in excellent preservation.

"The exception to the parallel with Orient was the finding within a small area, and almost wholly at or above the 2½-foot level, of a few sherds of probably two clay pots. These had conoidal bottoms, sides rising V-shaped, and rims curved in. They are of closely knit texture and are hard, red-yellow to brown in color, cord- or fabric-paddle marked, apparently over the entire surface, with smooth interior. Two or three of these sherds were found at considerable depth and near cached material. A question is raised as to whether these clay sherds are a part of the culture complex of the cremation site, or whether they

are intrusive. Their environment in the site showed decided disturbances: stray arrows, steatite and even many calcined bone bits occurred in it. It is probable, in any event, that aborigines continued to visit this hill even to a late date. The one triangular arrowhead was found at the grass roots, and on the surface was a fragment of a trade pipe. A large hearth staining the earth a foot deep was close to the surface directly over the clay-sherd area.

"It is perhaps needless to add that there was not a shell or bone implement in the site, and that its material is wholly at variance with that of the Eastern Long Island shell pit camp and village sites. The provenience of these stations is undoubtedly to be looked for in an early period in Connecticut. The development of scientific exploration in that state is eagerly awaited." (*W.A.R.*)

The following report from Dr. Mary Butler, Assistant Archaeologist of the Pennsylvania Historical Commission, on her notable field work of the past season, was received too late for inclusion in the January issue.

"From April to August I was in the field in Somerset County, in southwestern Pennsylvania. Digging at a village site near Somerfield, on the Youghiogheny River, lasted through June and uncovered six flexed adult burials and eighteen extended infant burials, one of the latter containing twins. Only one skeleton had been found in earlier digging in this county, when two other village sites were excavated: one on the Youghiogheny River, the other on its tributary, the Casselman River, the LWD-WPA financed work done on these three sites represents the only serious archaeological work undertaken in this county, which lies on the Allegheny plateau and was previously considered to have been in Indian times only a hunting ground, with no permanent villages. These sites are all pre-contact, and present different stages in the development of the local phase of late Woodland culture, with Iroquois influence that varies in strength from site to site. The local types of pottery pipes and pottery decoration are distinctive enough to warrant giving, for the present, the name 'Monongahela Woodland culture' to this complex, which extends from the southern Allegheny plateau south and west to the West Virginia line, since all the sites so far investigated in Somerset, Westmoreland, Fayette, and Greene counties are in the Monongahela drainage.

"Since August I have been in Greene County where excavations of hill-side village sites suggest not only that the Monongahela Woodland culture was the predominant one in this section (the southwest corner of Pennsylvania), but that it persisted there into early contact times. Sites with slab-covered infant burials and trade-copper ornaments, and the appearance of claw-shaped and vasiform stone pipes, suggest influences here that have not appeared as yet farther east." (*W.A.R.*)

From the University of Pennsylvania Museum comes the following account of detailed pottery analyses being conducted there which promise to be a valuable technological aid in the study of aboriginal ceramics.

"The Ceramic Laboratory of the University of Pennsylvania Museum, under Dr. Leonard C. Riesch and Mr. Donald Horton, completed during the summer a chemical and petrographic study of sherds from Slaughter Creek, Delaware, and Sharpstown, Maryland. A study of sherds from the Safford Mound at Tarpon Springs, Florida, will be completed shortly. Renewal of its WPA grant has made it possible for the Laboratory to begin work on the analysis of a group of sherds collected by Dr. J. Alden Mason in Colombia. Concurrently, a study is being made of Roman red-glaze ware.

"A report on the Delaware and Maryland sherds is being published in the Bulletin of the Archaeological Society of Delaware. The report is offered as evidence that the methods of technological analysis advocated by Shepard can be applied productively to a very primitive pottery. Although the two groups of sherds are indistinguishable, with regard to stylistic features and many of their paste properties, it was found on analysis that both qualitative and quantitative distinctions could be made.

"The study of Florida sherds revealed a number of compositional groups, among them sandy wares, calcareous wares, and, very prominently, a light-weight, smooth, thin-walled type containing a great abundance of siliceous sponge spicules. These sherds contain a relatively greater volume of spicules than do similar South American wares, described by Linne." (*W.A.R.*)

Southeastern Area

Intensive archaeological research in Tennessee, is now entering its fourth consecutive year of uninterrupted work. Mr. T. M. N. Lewis, Department of Archaeology, University of Tennessee, submits the following report:

"During this period of time, we have excavated every earthwork, and numerous village sites, in three counties, and a portion of the earthworks and village sites in seven additional counties. In the past year an exhaustive investigation has been made of three village sites and their associated earthworks in Hamilton County; in Humphreys County, one site was completely excavated, one partially excavated and numerous site surveys completed; in Cheatham County two sites were partially excavated over a period of eight months, and in Davidson County a large burial ground was partly excavated.

"Our excavations in the middle Tennessee counties of Humphreys and Cheatham yielded the usual traits which are attributable to the so-called Tennessee-Cumberland aspect. Three truncated pyramidal earthworks were investigated in this area. The customary superposition of occupation levels was encountered, on which appeared the postmold patterns of houses. In one instance the eroded outer portions of an earthwork were removed down to the hard surface of an older fundamental pyramid. Two ramps led to the summit from opposite directions and the wall trenches of a rectangular structure appeared on the summit. The four sides of the pyramid sloped at a sharp angle and, generally speaking, it bore shape resemblance to structures at Chichen Itza. In no instance did burials occur in these mounds.

"In spite of the many years of cultivation and erosion to which these large pyramidal earthworks have been subjected, many still retain well-defined angles. Some cover about an acre of ground, and one imposing pyramid near Pinson soars to a height of nearly eighty feet.

"Manifestations encountered in east Tennessee are of another culture facies, although there is a professed overlapping of traits which are attributable to the Tennessee-Cumberland aspect. The pyramidal earthwork recurs in this part of the state, and the contents are exceedingly more informative. One of these, which was located on the Tennessee River not far from Chattanooga, contained ninety-six burials, in addition to eleven superposed levels bearing structure patterns. For the most part, these burials were accompanied by artifacts of copper, shell, bone, stone and pottery. Among these was a monolithic ax analogous in every respect to one recovered from an earthwork in Moundville, Alabama, during the last century, illustrated in Thruston's *Antiquities of Tennessee*. Other objects were in the nature of head gears of sheet copper, copper-plated earplugs, large copper feather with human eye symbol in repouseé, copper celts, beads of pearl, mussel and marine shells, incised shell gorgets and Busycon shell dippers. All burials were inclusive to the mound and originated at various depths. Postmold structure patterns were for the most part symmetrical, and both square and circular elevated altars or fireplaces occurred. The indurated clay floors of these structures were so hard in some instances as to offer considerable resistance to the mattock.

"Dwelling-house floors occur in superposition in village areas, and in one instance the detritus was of sufficient depth to permit us to maintain a stratigraphic record of features, burials and culture-indicative materials. Stockades surrounding the villages have been traced for nearly their entire length. In one village area about twenty dwelling house patterns have been uncovered.

"By the time this communication goes to press we will have begun work in the Hiwassee Island area near Dayton, Tennessee, with a force of 200 men. The investigations are being financed by the University of Tennessee, the Works Progress Administration, the Tennessee Valley Authority and the National Research Council."

South American Area

Dr. Hermann von Walde-Waldegg has returned from a five months' trip to Colombia. He excavated at San Augustín, uncovering many statues characteristic of that site. He also found stratified pottery at San Augustín which should be an important contribution to the archaeology of Colombia. A stone described as over eight feet high and four feet wide is covered with designs which Dr. Waldegg thinks may represent a calendar. The expedition was sponsored by the Boston College Museum, and the Museum of the University of Pennsylvania. (*W.C.B.*)

Mr. Hans E. Fischel of Berkeley, California, reports a speech made by Dr

Julio C. Tello of the University of San Marcos, Lima. This speech was delivered at the San Francisco Museum of Art on September 8th. Dr. Tello presented his thesis that the intra-Andean valleys, such as the Callejón de Huaylas and Chavín, were the seat of all Peruvian civilizations. In his lecture he illustrated his concept of the spread of this basic civilization to the coast of Peru, at Nepeña and Paracas, and to the interior of Peru.

The Institute of Andean Research has been organized to promote and foster anthropological research in the Andean region. The Executive Committee is composed of nine members: A. L. Kroeber (Chairman), W. C. Bennett (Secretary-Treasurer), A. V. Kidder, A. M. Tozzer, P. A. Means, Leslie Spier, G. C. Vaillant, F. C. Cole, S. K. Lothrop. Dr. Julio C. Tello has been appointed Peruvian Representative and Counsellor for the first year. (*W.C.B.*)

General

The first of a series of leaflets to be published during the winter by the Colorado Museum of National History: *The Amateur Archaeologist*, by H. M. Wormington (price 10 cents), is now available. The purpose of these publications is to enable the layman interested in archaeology to obtain an adequate scientific background in the simplest and cheapest way possible. The first issues of this series will include simplified discussions of all phases of archaeology, lists of definitions, bibliographies, and similarly informative material.

A Regional Meeting of the Society for American Archaeology was held in connection with the meetings of the Central Section of the American Anthropological Association in Iowa City, Iowa, on April 16 and 17. A part of the program was devoted to papers presented by Affiliates of the Society. A more complete report on the meeting will appear in the next issue of this journal.

BOOK REVIEWS

Additional Information on the Folsom Complex. FRANK H. H. ROBERTS, JR. (Smithsonian Miscellaneous Collections, Vol. 95, No. 10, with topographic map, 5 text figures, and 12 plates, Washington, 1936.)

This paper, together with No. 4 of Vol. 94 (1935) of the same series, gives an account of the author's first two seasons' work at what seems at present to be the most easily understood, if not also the most important, archaeological station on the American continent—viz., the Lindenmeier site, near Fort Collins in north-central Colorado. The first report, entitled *A Folsom Complex* (reviewed in this series, Vol. 1, No. 2, 1935) outlined the story of discovery (surface finds) by local collectors in 1924, of identification as of "Folsom" date by Prof. Renaud in 1931, and of the detection of a subsurface occupation level by Dr. Roberts himself in 1934; described the site and the trial excavations of that same year; and gave a descriptive analysis of the artifact remains thus recovered. The present paper is a supplementary report covering all aspects of the new and extensive systematic excavations carried out during the season of 1935.

The Lindenmeier site is located in the northeast corner of Larimer County, in an ancient, treeless, gently sloping basin forming part of the upper or northern limits, presumably, of the Box Elder Creek drainage system, which opens southward towards the South Platte valley. Viewed as a topographic unit this ancient basin floor or primary valley, which locally reaches an altitude of about 6600 feet, is traversed by an old secondary valley eroded by intermittent stream action to a depth of 100 feet or more. The actual spot of archaeological interest is a terrace (part of the ancient basin floor) flanking the north rim of this old valley. The relic-bearing portion of this terrace stretches along the straight valley rim for a distance of not less than 600 yards and ranges back, northward, from this rim for all of 100 yards. About midway on the stretch the terrace is severed by a tributary ravine, in part at least of relatively recent date, which, after cutting back northward for a hundred yards of more (i.e., clear across the relic-bearing area) heads westward, up a slight hollow in the old basin floor, taking a course parallel to the valley rim and ending up in a still more recently eroded short deep gulch. The result is a finger-like east-west trending terrace spur about 500 yards long and averaging about 100 yards in width, the surface of which for the most part slopes northeastwardly or away from the valley rim towards the gulch. Ignoring the presence of the ravine and the localized northeastward surface slope, the terrace considered as a whole naturally slopes downstream or eastward, the drop for the 600 yards being about 60 feet. At the lower end (east of the ravine), however, the drop appears to have been augmented by recent wind and water erosion (perhaps the same that produced the ravine), for here the first recovered flint artifacts (ca. 200) were found

lying on or near the surface, while in the west bank of the side ravine the culture stratum was found exposed at a depth of 6 feet, and farther up, midway on the spur, at depths ranging from two feet in the valley rim bluff to fourteen feet in the opposite gulch bank. The situation in its entirety is well brought out by two photographs in the preliminary report and by a topographic map in the paper here under review.

The 1935 excavations were confined to two places on the terrace. Near the lower end, east of the ravine, where the first surface artifacts were discovered, a large pit was dug in what seemed to be a concentration area and which at depths ranging from one to three feet yielded numerous partly articulated bison bones (some split and cut) and thirty-four flints. The most interesting find here was a vertebra with the tip end of a projectile point lodged in the foramen. Close to the upper end or about midway on the isolated spur where trial excavations had been made the previous year, particularly on the lower or gulch side, and tying up with these, two large trenches were dug, one of them more than halfway and the other completely across the 100 yard wide relic-bearing area. These trenches, about 100 feet apart at the end of the valley rim but converging towards the old excavation in the gulch bank, were ten feet wide and were dug in ten-foot sections, the culture material from each section being kept separate. This trenching involved, first, the rapid removal of the sterile overburden and, second, the careful excavation of the culture stratum below. The overburden, that is, the recent basin floor drift material washed down over the old occupation surface, consisted of a top soil, streaks and lenses of clay, sand, gravel, and scattered bowlders, which together attained a thickness ranging from two feet at the valley rim to fourteen feet at the other extremity in the gulch bank. The culture stratum itself, made up of an ancient black soil derived partly from an Oligocene clay below and mixed with camp debris, had a thickness ranging from about one to three feet, the increase being also in the downhill or gulch direction. All of the ten-foot section faces were plotted, likewise the four side walls of the two trenches, the latter of which are reproduced on a scale sufficiently large to give a detailed idea of the slope of the original camp-floor surface as well as the composition and stratification of the overburden.

For reasons partly my own, I have taken some pains to describe the general setting as fully and clearly as possible. It must now suffice briefly to sum up the results obtained from the trenches. As already indicated, the culture stratum here thickens more or less uniformly in the downhill direction due, in the writer's opinion, to natural drifting. There are, however, actual stretches along the two trench sections, apparently high spots in the original camp floor, where neither old soil nor camp debris is present, suggesting either that the mixed soil-and-culture stratum was completely eroded away or else that the locality accommodated several separate habitation sites. Probably both factors have to be taken into account. At any rate, the percentage yield of artifacts varies considerably, showing that there were areas of concentration, marking, it

would seem, actual habitation sites and workshops, as is suggested also by the uneven distribution of hearth sites and animal bones.

Coming finally to the artifacts themselves, the 1935 series is considerably richer than the 1934 lot both in number and variety. Dr. Roberts has separated the material into four major groups: worked bone, worked stone, worked flint, and a considerable quantity of rejects, including chips, flakes, spalls, and cores, as well as a number of unworked nodules and bowlders. The total number of classified and for the most part implemental objects is given as 750, and these are separated into thirteen type groups, as follows: Folsom points, Yuma points, and small subtriangular points (arrow points?), 11.3 percent; side-scrapers with straight, convex, and concave retouched cutting edges (56 percent) and end-scrapers (44 percent) of subtriangular and oblong outlines, 32.8 percent; needle-pointed gravers, 5.6 percent; chisel-pointed gravers, 1 percent; choppers, including perhaps some biface blanks, 0.5 percent; knives, some of oblong prismatic flakes with more or less of marginal pressure retouch, others also of flakes partly shaped by pressure chipping, and still others of pressure-chipped biface form with midrib fluting like the Folsom points, 3 percent; large blades, including possibly also some biface blanks, 6.3 percent; hammerstones, 0.8 percent; rubbed hematite pieces, 1.6 percent; fragmentary sandstone polishers and rubbers, two dished palettes with traces of red paint, a piece of drilled stone, and a piece of soapstone with notched edges, 4 percent; and, finally, fragmentary bone objects, including cut and split bones, used pointed splinters, awls(?), knives or fleshers (two), a paddle-like scoop, and a complete circular disk with marginal notches, 0.5 percent. The 750 piece list includes, however, 13.6 percent of midrib or channel flakes assigned to no special functions, and closes with 19 percent of unclassified flakes. Incidentally, the presence of the piece of drilled stone implies that the drillpoint is to be added to the list. Mention must also be made of the fact that the Lindenmeier industry is largely of the flake order, only 1.5 percent of the inventory being of the core order. All of the segregated implemental types, or at least those of flint and stone, are amply illustrated.

The faunal species have also been increased by the 1935 excavations. The list of mammals now includes the bison (extinct form), fox, wolf, rabbit, and pronghorn antelope. In addition nine species of mollusks have been identified, two of which are locally extinct.

Having taken up so much space with the bare statement of facts, there is little left for comment. Nevertheless it must be emphasized that we have here for the first time not only Folsom and Yuma points, but, as the titles of the two papers suggest, a real complex of traits. This complex, viewed as a whole, strikes one as much less unique and exasperating than do the Folsom and Yuma points taken by themselves. To the reviewer, at any rate, neither the considerable range of implemental types, including even rubbing stones, nor the character of the flint-working technique as exhibited especially by the

Folsom and Yuma points seems to favor any really great antiquity for the Folsom industry, whatever the faunal remains may suggest. The technological and compositional tradition is Neolithic rather than Paleolithic. Moreover while the depth at which the Lindenmeier culture stratum occurs certainly argues for a not inconsiderable age, 14 feet is not 180 feet, the depth at which a Mousterian-Aurignacian industry has been found in China. In other words, with all due respect for expert geological and paleontological opinion, it is always to be remembered that until we find in this country a still older and more primitive industry from which the Folsom complex can be derived, we have to assume its ancestry to lie in the Old World. This puts a limit to our time estimates; for even if we venture, as so many (even I myself) have done, to link our Folsom industry with the Solutrean horizon, we can scarcely date it back the suggested 12,000 or 13,000 years, unless by a slender chance the Solutrean technique originated, say, in central Asia and reached America as soon or sooner than it did middle and western Europe.

Dr. Roberts' admirable report presents several interesting and important secondary items. One is his determination of the order in which the work was done to produce the Folsom point. Another is his stratigraphic proof that while the Folsom and Yuma points may have been in part contemporary, the latter survived the former. This view seems in keeping with the character of the techniques involved, for while there is a strong resemblance between the Folsom midrib fluting and the transverse ripple flaking on the Yuma points, the latter style of work seems the more advanced. Incidentally, such ripple flaking as is exhibited by the Yuma points was the final and, be it noted, very late step achieved by the flintknappers of Denmark and Egypt, and apparently also by the Indians of southern California.

N. C. NELSON

Excavation of the Nowlin Mound. GLENN A. BLACK. (Indiana History Bulletin, Vol. 13, No. 7: 207–305, 30 figs., 69 plates, Indianapolis, 1936.)

The Nowlin mound, located in Dearborn County, in the southeast corner of Indiana, was excavated during the summers of 1934 and 1935. The inclusion of a map of this state and parts of Ohio and Kentucky would have been helpful to readers not familiar with the region in aiding them to place it more readily geographically. In outline this mound had somewhat the appearance of an ellipse with the side slightly constricted, about 165 ft. long, 70 ft. wide, and 15 ft. at its highest point near the western half.

After excavation this tumulus proved to be two adjoining earth mounds with the gap between subsequently filled. This complicated structure, with its seven log tombs and extended burials as well as four reburials, is graphically portrayed on Figure 30, an excellent and important reproduction which in itself clearly shows the detailed and painstaking excavation methods used by Black. In the opinion of the reviewer this report might well serve as a splendid

example of how mounds in the Mississippi valley should be excavated. Every amateur will do well to familiarize himself with these details, absolutely essential at the present time if an accurate reconstruction of our fast vanishing prehistory is to be made.

One of the outstanding techniques utilized by Black was the excavation of a portion of the mound during the first season, disclosing some of the burials, then the re-covering of them sufficiently for protection against the elements and vandals during the intervening months. The following season the remaining portion of the mound was completed. As a result all the important tombs which had been covered by the three mounds were revealed *in situ*. The reader can thereby see at a glance (plates 62, 63, and 64) the entire floor with its four tombs, their positions relative to each other, height above floor, log moulds, and earth around the bodies. From such illustrations scale models can easily be reconstructed. This is commendable for such a large mound and should be adopted whenever practicable.

The "summary" (pp. 275–278) and "cultural affinity" (pp. 297–303) are concise and yet sufficiently detailed. The summary clearly reconstructs the sequence and methods of burials. The western mound, with its four superimposed burials, was constructed first. After this the east tomb was prepared and covered, and another burial placed on the apex of the primary mound and covered to a height of about fifteen feet. The periphery of this mound overlapped the edges of the western mound. A final interment was placed at the junction. The intervening area then was filled, forming the single elliptical mound.

The artifacts are carefully described and analysed. These seventeen traits together with the remaining nine structural and burial traits are finally compared to the trait list of the Adena culture, or, to use the taxonomic classification, "Adena aspect." By using such trait lists Black saves endless descriptions and references, and at the same time shows the cultural relationship of the prehistoric builders.

However, one cannot help feeling that the author is impatient to pigeonhole the archaeological cultures in the Mississippi valley as he applies and emphasizes the taxonomic classification. To understand thoroughly and appreciate fully his section on cultural affinity requires considerable experience and reading of Mississippi valley archaeological reports. Nevertheless, archaeologists must be careful to use this classification as the means to an end rather than the end itself. One word of warning for all of us: A simple comparison of traits may overlook the details of juxtaposition and associations in the mound, essential in comparing the entire complex of one site or group of sites with another. It is advantageous and should be our aim to show a reconstructed living culture, or tribal relationships, as well as migrations and cultural development wherever possible. Future students without the essential background and derivation of these traits may miss the forest for the trees, or even get too far

out on the limb of a single tree. Until we are more certain and have the unquestionable evidence of a relationship with one of the recognized basic cultures, it seems to the reviewer that no harm can develop and no misguided hypothesis can be advanced by treating this Adena aspect as a separate entity. At such a time, when everyone can recognize the cultural relationship between the Adena aspect and its obvious position in one of the Mississippi valley patterns, all of these foci and components will fit into the proper taxonomic classification. This attitude may seem too conservative, but it will spare us, in the years to follow, the difficult task of correcting published conclusions.

"Notes on the Pottery," by J. B. Griffin and F. R. Matson, Jr., is included in this report. The pottery from an Adena mound is highly important, for out of the seventy mound sites listed by Greenman and from which the trait list is derived, only one mound yielded any evidence of pottery. Black's excavation, however, produced several undecorated sherds, which are not illustrated, but a print showing the sherds was sent to the reviewer. Because of their type and lack of decorative features, one of our best clues to a relationship between Adena and the Hopewell, Fort Ancient, or any other Mississippi or Woodland group is lacking. This would seem to justify placing this aspect in a class by itself at the present time. Let us sincerely hope that another mound of this aspect will produce decorated potsherds and vessels which will unquestionably solve this puzzling prehistoric manifestation in the upper Ohio River drainage.

FRANK M. SETZLER.

The Pottery of Pecos, Volume II. A. V. KIDDER and ANNA O. SHEPARD. (Papers of the Southwestern Expedition, number seven, Department of Archaeology, Phillips Academy, Andover, Massachusetts, xxxi, 636 pp., 309 figures, Yale University Press, New Haven, 1936.)

The subtitle of the volume defines the contents more specifically: "I. The Glaze-Paint, Culinary, and Other Wares by Alfred Vincent Kidder; II. The Technology of Pecos Pottery by Anna O. Shepard." The former, as Part One of the volume, occupies pages 1 to 388 inclusive. The latter, constituting Part Two (pages 389 to 587 inclusive) is reviewed separately. Part Three is devoted to a Discussion (pages 589 to 628) and a Bibliography (pages 629 to 636). In addition to the table of contents and the list of illustrations, there is an introduction by Dr. Kidder (pages xvii to xxxi). The frontispiece illustrates in color one each of the seven types of glaze bowls. The illustrations, all listed as "figures," include half tone reproductions of photographs, full pages devoted to drawings, and text figures.

Part One contains a carefully organized and detailed discussion of thirty-one ceramic types grouped under four major headings: The Glazes, Undecorated Smooth Wares, Culinary Wares, and Trade Wares. The subjects treated in the discussion of each of the types are arranged in the same order in all sections to facilitate ease of reference, as follows: general characteristics, vessel

shapes, general decorative features, bowl interior decoration, bowl rim decoration, bowl exterior decoration, olla decoration, and shouldered bowl decoration. The instructive text of each section, supplemented by illustrations of vessels, diagrams of rim profiles and vessel shapes, and a large number of carefully executed drawings of design elements and patterns, makes this part of the volume a reference work indispensable to all specialists in Southwestern ceramics. It is of value to students of other ceramic areas because it illustrates one satisfactory method of presenting a mass of very complex ceramic data. Quite unintentionally, Dr. Kidder has also demonstrated here the validity of one argument in favor of the delayed publication of a final report. The searching analysis of complex problems, the recognition of the significance of details, and the sound interpretations which are found throughout this statement are the result, in part at least, of painstaking intimate study of the data over a period of almost twenty years.

Part Two of the volume, which contains a discussion of the methods of technological analysis and a description of the results of the application of these methods to the Pecos wares, is a report which has been awaited with great anticipation. It will unquestionably become a classic in its field, and will supply the foundation for future work of students of ceramic technology in archaeology.

Those American archaeologists who are not specializing in the Southwest will find Part Three and the Introduction of greatest value. The first few pages of the introduction are devoted to a very brief outline of the history of the ceramics of Pecos and their interpretation. The major part of this section, however, is concerned with a discussion of various techniques of ceramic research used in the Southwest. The shift of emphasis from whole vessels to sherds which occurred about twenty-five years ago brought about the establishment of new categories of evidence, and a need for refinement of observations leading, within recent years, to a demand for objective, measurable, and above all, recordable ceramic criteria. The significance of the study of the technological properties of wares is treated; the usefulness and limitations of surface sherd surveys are discussed; and the contributions and dangers of the recent developments in establishing systems of nomenclature are brought out. At the close of the Introduction, Dr. Kidder has given a most useful table relating the more recent binomial nomenclature (locality term-descriptive term) to the older numerical Pecos terminology of the Glaze-wares, which he has preferred to retained in the text of the volume.

This discussion will prove interesting to all ceramic archaeologists, in spite of the fact that it deals entirely with Southwestern methodologies. This preoccupation with the problems of a particular ceramic family leads Dr. Kidder to say (p. xxix); "Until such time, therefore, as the technologists shall have isolated significant technological characters and have worked out methods for their recognition, measurement, and recording which can safely be used by persons untrained in laboratory technique, archaeologists should confine them-

selves to observation of the surface features of pottery." Yet in the eastern United States, the number of and easily observed differences in paste and temper of wares require the description of these technological characters in relatively inaccurate terms, in order that the ceramic types may be identified satisfactorily.

One of Dr. Kidder's statements is here lifted bodily from its context because of its wide application and its epigrammatic quality (p. xxvi):

"Our adolescent discipline (I do not venture to call it a science) is merely suffering from growing pains; it is having its ceramic measles. The study is extraordinarily complex, materials are abundant, workers many, judgments diverse. Temporary confusion is inevitable. But sound classifications and valid deductions eventually will emerge."

The final forty pages of the book are devoted to a "Discussion," rather than a conclusion. Here the new term "Anasazi" is introduced which (p. 590) "has the same meaning (Old People) in Navajo that Hohokam bears in Pima. It would apply to the Basket Maker and to those Pueblo groups which can be shown to have derived the basic framework of their material culture from the Basket Maker." He seeks to define Anasazi pottery in a statement which I quote at some length because of its interest to all students of North American ceramics. It should be noted that the properties of the paste and temper do not enter into the definition (p. 590):

"There is never the slightest difficulty in telling an Anasazi pot, ancient or recent, good or bad, from a Hohokam vessel or one from the Mounds or Middle America; but it is hard to say just how one does it. Yet the attempt must be made: first, as a step toward more accurate classification; second, to permit segregation of those basic ceramic traits which will become of greater and greater significance when we reach the stage, as some day we must, of considering the broader aspects of New World ceramic history.

"Anasazi pottery was made by coiling. This serves to distinguish it from Hohokam ware, which was produced by the paddle-and-anvil method, but not, apparently from all pottery of eastern United States, nor from that of Mexico. From the Mexican and Eastern categories (we are not yet in position to say whether or not they also should be subdivided into groups comparable to the Hohokam and Anasazi) Anasazi differs in several important particulars: great simplicity of vessel shape; formal, balanced, geometric, painted decoration; use, during the middle periods, of corrugation as a decorative device; lack of paddled, stamped, scored, incised, modelled, or applied plastic ornament; sharp distinction between culinary and non-culinary vessels."

Then, following a brief analysis of our present knowledge of the Anasazi ceramic family and the problems arising therefrom, the author devotes the remainder of this final chapter to a thoughtful review of the development of the ceramic art at Pecos, paying special attention, of course, to the glaze-paint and culinary wares.

This volume, which records in detail the results of research upon a restricted and specialized problem in our science, is the product of openminded and meticulous scholarship, and an outstanding contribution to North American archaeology.

CARL E. GUTHE

The Technology of Pecos Pottery, by ANNA O. SHEPARD. (Part Two of *The Pottery of Pecos, Volume II*, A. V. Kidder and Anna O. Shepard, Papers of the Southwestern Expedition, number seven, Department of Archaeology Phillips Academy, Andover, Massachusetts, pp. 389 to 587, Yale University Press, New Haven, 1936.)

The long awaited technological report of the Pecos pottery more than fulfills all expectations. It is a truly scholarly study representing the summarized results of countless hours of detailed laboratory work in which the methods of testing were critically examined, and the sherds analyzed. It is a book that should long be a standard reference work for all interested in the study of pottery, for it contains not only a report of the Pecos pottery, but also a discussion and evaluation of many technological criteria.

As Miss Shepard so well points out (p. 389):

"The immediate purposes of a ceramic technological investigation are to identify materials and locate their sources, to study the indications of workmanship, and to describe properties by reference to exact, impersonal standards. There are two ultimate aims in the interpretation of technological data. The first is to trace the history of the potter's craft, the second is to recover more accurately and in greater detail than is possible by other methods the evidence which pottery preserves of cultural development, contacts, and influences. . . . The study is intensive and detailed, but its chief advantage lies in the fact that it is based upon principles and procedures of the exact sciences."

The methods of technological analysis discussed are: the study of body and slip clays; identification of tempering material; analysis of pigments; determination of firing temperature; description of physical properties—color, hardness, strength, and porosity. The nine-page section on standards for the field worker is one which archaeologists will especially welcome, for it succinctly presents the possibilities and limitations of the student who, although not a a trained ceramist, must describe the physical properties of the pottery and sherds excavated. The topical summary at the end of the section is a valuable guide for field and laboratory study and may be readily adapted to multigraphed description cards.

The descriptive standards suggested are for Southwestern and Middle American pottery and, as Miss Shepard recognizes, they may have to be modified by workers in other ceramic fields. This is particularly true of the classification of tempering material, "Very Coarse" being defined as "inclusions over 1.0 mm. in diameter." As most of the grit-tempered ware of the eastern United States would come under this category, it would probably be well to expand the scale or at least to specify the size range of the "Very Coarse" particles if this terminology is employed. Since it is possible to measure the size of the tempering material, a classificatory system is not essential except for rough grouping.

Before employing the proposed tests in ceramic areas other than the Southwest, it would be well to study them carefully to establish their validity as

Miss Shepard did. For instance, in measuring the porosity of the sherds, she boiled them for a period of three hours in distilled water, although the standard test method of the American Ceramic Society uses only a two-hour period. Low-fired pottery, such as the wares of the Woodland pattern of the Eastern United States, does not require a three-hour boiling period for saturation. When defining colors, Ridgway's system is suitable for unglazed pottery and Miss Shepard also prefers it for the glazed wares. However, when one studies Oriental glazed ceramics with the subtle color variations, Ridgway's system is inadequate; Maertz and Paul's *Dictionary of Color* is more satisfactory. Because of his wide experience in the field of Chinese ceramics, Benjamin March, in his *Standards of Pottery Description*, advocated the use of the latter book. Since the nature of pottery varies so greatly in different parts of the world, it would not be well to adopt hastily a uniform set of standards before intensive studies have been made of several of the diverse types. Miss Shepard says (p. 394): "The present discussion is not given with any idea of laying down procedures which must invariably be followed or of treating fully the entire scope of the subject, but rather in the hope that it may be suggestive of the varied aspects and possibilities of the work, and that it may bring out the importance of thoroughness and exactitude." She has fully achieved her purpose, and has given us a guide and example of scientific procedure for all future work in ceramic technology.

The study of modern Pueblo pottery making which is presented is most interesting and clearly demonstrates the value of applying ethnological methods as well as analysis and synthesis to the study of pottery, wherever possible.

The latter half of the report is devoted to a detailed discussion of the Black and White, Biscuit, Culinary, and six Glaze wares of Pecos. The data on each type are presented tersely and well, and followed by lucid interpretation. In presenting the information concerning the Modulus of Rupture and Porosity, the "average" and the "range" of the results of the tests are given. It would have been helpful if the Standard Deviation and the Coefficient of Variation had also been calculated for these two criteria, in order to establish the consistency of the data and to present it in a form better suited for comparative purposes. The number of sherds measured in each case might also have been stated.

Because of the great mass of material presented, it is a little difficult to understand the differences between the wares without making a detailed study of the report. A comparative table of the physical properties would have been a welcome addition to the book.

The results of the Pecos study clearly demonstrate the importance of the petrographic examination of sherds, especially in the form of thin sections. Because of the great variation in the surface geology of small geographic areas in the Southwest, petrographic sherd analyses are of prime importance, but it may well be that in other regions where the surfaces are quite uniform, as in

the glaciated areas, other methods of study will prove more helpful. Miss Shepard has shown by a study of the clay and tempering materials used in the Pecos pottery during the successive periods of the pueblo's existence, and of the clays and rocks of the region, that pottery was not always manufactured extensively at Pecos. During the early periods, much was imported from the Santa Fe province to the northwest of Pecos, and from the Galisteo region to the southwest. Gradually local wares assumed more importance, until by Glaze V times Pecos was ceramically independent of outside sources; but in the Glaze VI period, non-local wares were again abundant. These facts, so sketchily outlined here, raise many questions concerning the economic position of Pecos in the Southwest, and its trade relations with other communities. Not until similar painstaking studies have been made of other wares of the Upper Rio Grande region can most of the questions be answered. The technological analysis of the pottery has completely changed many archaeological concepts pertaining to Pecos. Dr. Kidder says (p. 601): " . . . Miss Shepard's technological findings have raised most serious problems. Everything was quite simple until she brought her relentless microscope to bear on the sherds from Forked Lightning."

The marked success of Miss Shepard's work does not establish her methods as a ceramic panacea for archaeologists. As Dr. Kidder points out (p. xxii): " . . . like all innovations which serve to complicate a science, ceramic technology will prove distasteful to some who find it beyond their ability personally to practice; as well as to others whose preconceived opinions it seems to contravert. On the other hand, there is danger that its satisfactory accuracy may lead others to swing to the extreme of depending entirely upon the microscope and the test tube, neglecting all older and less precise methods of evaluation. This tendency, however, can be counteracted by remembering, as archaeologists must always do, that the objects they excavate are the handiwork of man, and that to their lifeless substance human beings have added something which no lens can reveal nor any chemical precipitate."

FREDERICK R. MATSON, JR.

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